Early infant feeding and neonatal survival in Nepal: Breastfeeding, colostrum and discarding of the first milk

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DECLARATION

I, Pascal Louis Graham Odent, confirm that the work presented in this thesis is my own. Where information has been derived from other sources, I confirm that this has been indicated in the thesis.

Signed: …… Date……

ABSTRACT

Of four million annual neonatal deaths, 80% occur in Asia and sub-Saharan Africa. To improve survival, cheap, equitable strategies are needed that are effective within community settings.

The overall aim of the thesis was to explore early infant feeding practices and neonatal mortality across two trial surveillance systems in rural sites in Nepal, with particular interest in the discarding of first breastmilk as a new dimension in early infant feeding. The primary objectives were to examine the associations between maternally reported discarding of first breastmilk and neonatal mortality in (i) Makwanpur and (ii) Dhanusha districts, Nepal, and (iii) to describe qualitatively the practices and reasons behind discarding of first breastmilk in Makwanpur. Secondary objectives were to describe associations of first milk discarding with suspected acute respiratory infection and infection-specific mortality, replicate previous analyses of established breastfeeding patterns, breastfeeding initiation time and neonatal mortality, clarify any relationship between prelacteal feeding and neonatal mortality, and to determine characteristics predicting discarding. A qualitative secondary objective was to explore the behaviours represented by mothers categorised as having discarded or not discarded their first milk.

Data on a range of variables were collected from mothers aged 15-49 who had given birth at least one month previously. Discarding of first milk was significantly associated with neonatal mortality in Makwanpur (n=15 919, aOR 2.21 [1.47 - 3.32], p<0.0001) and Dhanusha (n=14 991, aOR 1.28 [1.00 - 1.62], p<0.043) after adjustment for several covariates including other infant feeding dimensions, and exclusion of deaths within two days of birth. There was dichotomy in perceptions of first milk. Practices of discarding included squeezing out small volumes of breastmilk before initial feeding.

The findings suggest that discarding of first milk represents an important dimension of early infant feeding in addition to breastfeeding initiation time, with implications for policy and research.

DEDICATION

This thesis is dedicated to my parents and parent-figures, for giving me the opportunity and encouragement to explore new avenues of intellectual pursuit.

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ACRONYMS USED IN THE THESIS

AHW	Auxiliary Health Worker
ANC	Antenatal Care
ANM	Auxiliary Nurse Midwife
aHR	Adjusted Hazards Ratio
aOR	Adjusted Odds Ratio
ARI	Acute Respiratory Infection
CHW	Community Health Worker
CI	Confidence Interval
CIHD	Centre for International Health and Development
DALY	Disability-Adjusted Life Year
DHS	Demographic and Health Survey
ENMR	Early Neonatal Mortality Rate
FCHV	Female Community Health Volunteer
FHW	Family Health Worker
GDP	Gross Domestic Product
GEE	Generalised Estimating Equation
GI	Gastrointestinal
HDI	Human Development Index
HP	Health Post
IgA	Immunoglobulin A
IgG	Immunoglobulin G
IgM	Immunoglobulin M
IMR	Infant Mortality Rate
LBW	Low Birth Weight
LNMR	Late Neonatal Mortality Rate
MAR	Missing At Random
MCAR	Missing Completely At Random
MCHW	Maternal and Child Health Worker
MDG	Millennium Development Goal
MIRA	Mother and Infant Research Activities (Nepali NGO)
MWRA	Married Women of Reproductive Age (15-49 years)
NMAR	Not Missing At Random
NMR	Neonatal Mortality Rate

NGO	Non-Governmental Organisation
NPR	Nepalese Rupee
OR	Odds Ratio
ORS	Oral Rehydration Salts
PAF	Population Attributable Fraction
PAR	Population Attributable Risk
PHC-C	Primary Health Care Centre
PMR	Perinatal Mortality Rate
PNMR	Post-Neonatal Mortality Rate
RCT	Randomised Controlled Trial
RR	Relative Risk
SBR	Stillbirth Rate
SD	Standard Deviation
SHP	Sub-health Post
SIgA	Secretory Immunoglobulin A
TBA	Traditional Birth Attendant
TFR	Total Fertility Rate
U5MR	Under-Five Mortality Rate
UCL	University College London
UN	United Nations
UNICEF	United Nations Children's Fund
VA	Verbal Autopsy
VDC	Village Development Committee
VDCI	Village Development Committee Interviewer
VHW	Village Health Worker
VLBW	Very Low Birth Weight
WHO	World Health Organization

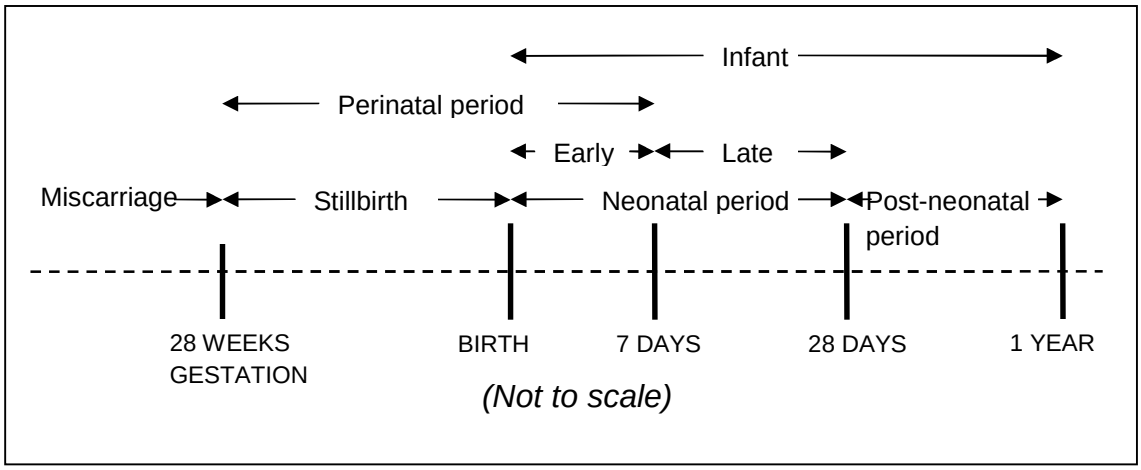
DEFINITIONS USED IN THE THESIS

Definitions regarding time and mortality

Describing the time-frame immediately postpartum, throughout the thesis **day 1** will be defined as the first 24 hours after birth inclusive, **day 2** as 24 hours to 47 hours postpartum inclusive, **day 3** as 48 to 71 hours inclusive, and so on. The **neonatal period** is defined as the first 28 days of a newborn infant's life. Within this, the **early neonatal period** describes the first seven days (days 1-7), while the **late neonatal period** describes days 8-28. Throughout this thesis, the **perinatal period** will be taken to occur between 28 weeks of gestation and the first seven days of life, although precise definitions do vary elsewhere[1] and a more widespread definition covers the period starting from 22 weeks gestation until the first week after birth[2]. I have selected a narrower definition of the perinatal period in order to remain consistent with data sources that contribute throughout this work. The **post-neonatal period** occurs between 28 completed days and 12 completed months post-partum.

A **stillbirth** will be defined throughout this thesis as an infant born and showing no signs of life at over 28 complete weeks of gestation, as documented in WHO definitions and indicators for circumstances in which stillborn babies are not weighed[3], despite variations in this definition also existing (the definition of a stillbirth was extended in England and Wales in October 1992 to include deaths at 24-27 weeks gestation in addition to those after 28 weeks)[1]. Deaths earlier than 28 weeks gestation will be taken to be **miscarriages** (spontaneous abortions). Again, the above definition thresholds are selected to remain consistent with sources of data drawn upon throughout the thesis.

Figure 1.1: Graphical representation of time definitions used



Mortality describes the risk of dying within a given time period. Thus, neonatal mortality is the probability of dying between birth and the first 28 completed days of life[4]. Infant mortality (${}_1q_0$) is the probability of dying in the first year of life, child mortality (${}_4q_1$) is the risk of dying from ages one to five and under-five mortality (${}_5q_0$) is the risk of dying between birth and age five[5].

The **stillbirth rate** (SBR) is the number of stillbirths per thousand births both live and still. The **neonatal mortality rate** (NMR) is the number of neonatal deaths per thousand live births. The **early neonatal mortality rate** (ENMR) describes the number of early neonatal deaths per thousand live births, while the **late neonatal mortality** rate (LNMR) describes the number of late neonatal deaths per thousand live births. The **perinatal mortality rate** (PMR) is the number of stillbirths and early neonatal deaths per thousand live and still births. The **post-neonatal mortality rate** (PNMR) is the number of post-neonatal deaths per thousand live births. The **infant mortality rate** (IMR) describes the number of infant deaths per thousand live births and the **under-five mortality rate** (U5MR) describes the number of under-five deaths per thousand live births.

Definitions regarding early infant feeding

The definitions of established breastfeeding categories used in the thesis, all based on World Health Organization definitions[6], are as follows:

- **Breastfeeding** means that an infant has received breastmilk (direct from the breast or expressed).
- **Exclusive breastfeeding** describes an established pattern whereby breastfeeding from the mother or wet nurse is accompanied by no other food or drink, including water, but with the exception of drops or syrups consisting of vitamins, mineral supplements or medicines.
- **Predominant breastfeeding** indicates that in addition to breastmilk and drops or syrups as described for exclusive breastfeeding, an infant may have also received water, water-based drinks such as tea, fruit juices, or oral rehydration salts (ORS) solution.
- **Full breastfeeding** is an umbrella term comprising exclusive and predominant breastfeeding.
- **Complementary** or **partial breastfeeding** describes the situation in which an infant receives both breastmilk and solid or semi-solid food. Several sources include feeding of breastmilk as well as formula milk or animal milk under this definition and the thesis adopts these same boundaries.

In addition, **prelacteal feeds** will broadly be defined in the thesis as any foods or fluids fed to a neonate before breastfeeding is established. The definition of prelacteal feeds used by the Demographic and Health Surveys, from which data is presented in the thesis, is “something other than breastmilk during the first three days of life”[7].

Unless stated otherwise for specific studies in the text of the thesis, **early initiation** of breastfeeding is synonymous with initiation of suckling within 24 hours of birth. Conversely, **late initiation** of breastfeeding describes initiation of suckling after 24 hours postpartum.

Colostrum is explored within the introductory chapter of the thesis, but can be approximately described here as breastmilk in the first two or three days postpartum. **First milk discarding** is a concept I introduce and explore throughout the thesis; the throwing away, to some extent, of breastmilk before the initiation of breastfeeding. As will be demonstrated, it is not necessarily synonymous with late initiation of breastfeeding.

CHAPTER 1: INTRODUCTION

1.1 NEONATAL MORTALITY

In this initial section I present the first justification for the investigation in the thesis. I make a case for the growing significance of neonatal mortality in addressing under-five mortality, while illustrating the geographic and socioeconomic inequities that exist. I put current trends in context with historic trends in child survival in the now-developed world and current priorities highlighted by the Millennium Development Goals. This leads on to a comment on strategies and challenges that have been met when trying to implement interventions in neonatal survival, highlighting the potential of some community-based approaches, particularly those involving breastfeeding, for high coverage, impact and cost-effectiveness.

1.1.1 Global trends in neonatal mortality, causes of death and the risk of mortality in different childhood periods

There are nearly 4 million neonatal deaths each year globally[4,8], and over 3 million stillbirths[9]. Neonatal deaths account for over a third of all deaths in children under five[10]. The great majority of these deaths – 99% - occur in developing countries[11], where 90% of infants are born[12]. Over 80% of these global neonatal deaths occur in Asia and sub-Saharan Africa alone[13], reflecting the inequities that exist in infant survival between countries[14]. While the absolute number of neonatal deaths is highest in South-East Asia, rates for neonatal deaths are often greatest in sub-Saharan Africa[15]. NMRs are typically above 30 deaths per thousand live births in countries across both regions[15], in comparison to typical neonatal mortality rates in more developed countries of below 10 deaths per thousand live births. Table 1.1 shows selected outputs of Demographic and Health Surveys (DHS) carried out in the last five years, giving results for the preceding 0-4 years, including Nepal for comparison.

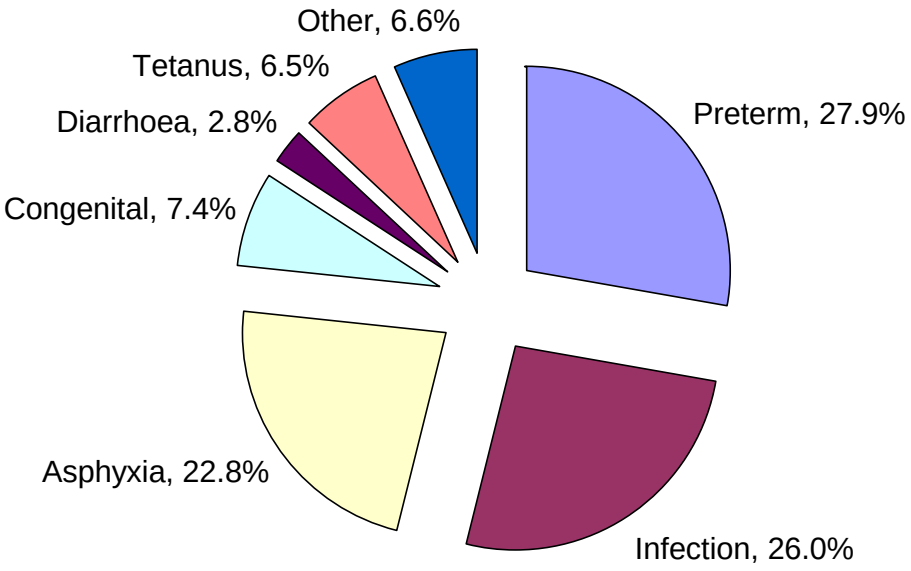
Table 1.1: Selected NMRs from DHS carried out in last five years[a]. Results describe preceding 0-4 years.

Location	DHS Year	NMR
Sub-Saharan Africa		
Dem. Rep. of the Congo[16]	2007	42
Ghana[17]	2008	30
Mali[18]	2006	46
Namibia[19]	2006/7	24
Nigeria[20]	2008	40
Sierra Leone[21]	2008	36
Uganda[22]	2006	29
Zambia[23]	2007	34
Zimbabwe[24]	2005/6	24
South Asia		
Nepal[7]	**2006**	**33**
Bangladesh[25]	2007	37
India[26]	2005/6	39
Pakistan[27]	2006/7	54

[a] DHS surveys obtained from www.measuredhs.com

As is illustrated in Figure 1.2, salient causes of neonatal deaths worldwide include prematurity (28%), sepsis and pneumonia (26%), asphyxia and birth trauma (23%), and congenital abnormalities (7%), based on estimates extrapolated from vital registration and study-based data[28,29]. Worldwide average estimates must be viewed alongside the fact that the distribution of causes of neonatal death varies between countries, in a correlation with absolute neonatal mortality[11]. In settings with a neonatal mortality rate of over 45 per thousand live births, nearly half of deaths are due to severe infection, tetanus and diarrhoea, whereas the proportion declines to near zero for tetanus and diarrhoea and less than 20% for sepsis and pneumonia in settings with neonatal mortality rates of less than 15 per thousand live births[11]. Prematurity and congenital abnormalities represent a greater proportion of causes of death in such low mortality contexts, suggesting that they are harder to reduce than infectious causes.

Figure 1.2: Estimated distribution of the causes of 4 million neonatal deaths worldwide in the year 2000[28]



The profile of causes of death changes from the early to the late neonatal period. Infections account for the majority of deaths in the late neonatal period, including generalised sepsis, tetanus, diarrhoea and acute respiratory infections[30,31], whereas the collective death toll of birth trauma, asphyxia, prematurity or low birth weight, and congenital abnormalities outweighs that of infections in the early neonatal period[31]. In other words, early neonatal mortality is mostly related to complications of delivery and poor health of the infant at birth, whereas late neonatal mortality is more related to infectious causes – an important point when identifying which interventions and causal pathways may improve early or late neonatal survival. However, it must be kept in mind that causes of death are often difficult to ascertain, given that most births occur at home unattended by medical personnel or because there are no specific diagnostic indicators[30].

Before covering mortality trends, a generalised profile of under-five mortality risk is described as follows. WHO global estimates suggest that 68% of under-five mortality is accounted for by infant mortality[8]. Within the first year of life, the neonatal period is the month of greatest risk of death, with 53% of infant mortality occurring as neonatal mortality worldwide[8]. 75% of neonatal deaths occur in the first week[8], and the first 24 hours of the early neonatal period is the single day upon which an infant is most likely to die.

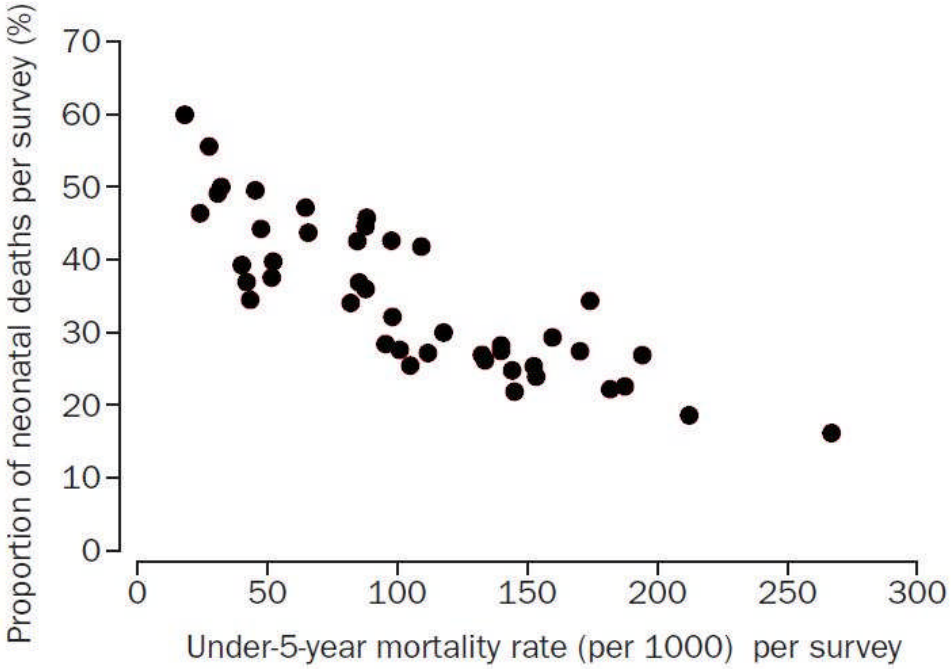
Infant and neonatal mortality have typically declined later and with less ease than child mortality, in the developed and developing world. Whereas child mortality (and overall mortality) exhibited the beginnings of a downward trend in northern and western Europe as early as the late eighteenth century[32], reductions in infant mortality were only observed a century later. For example, there was no recognisable decline in infant mortality in England and Wales until the 1890s[33]. This pattern was similar in France and the Netherlands, and comparable in Sweden, with mortality between ages one and five starting a trend of decline significantly before identifiable falls in infant mortality[34].

In developing countries there has been little recent improvement in neonatal mortality, despite large reductions in child mortality in the latter half of the twentieth century[11,35]. As a result, the proportion of child deaths that happen in the neonatal period is increasing[11], and neonatal deaths account for a greater proportion of child deaths in countries with lower under-five mortality rates[36].

Figure 1.3 illustrates this concept with data from 44 DHS surveys[10]. Countries with lower infant mortality rates have a greater proportion of their total neonatal mortality rate accounted for by early neonatal deaths[2].

Such trends highlight the point that strategies to reduce global neonatal mortality in developing countries are crucial, because of the growing importance of newborn survival to overall child survival.

Figure 1.3: Relation between U5MR and percentage of such deaths occurring in neonates. Adapted from Black et al., 2003[10]



During the United Nations Millennium Summit in 2000, 147 heads of state collectively agreed to adopt the Millennium Development Goals (MDGs), which set quantitative targets for 2015 to improve a series of indicators that included poverty, gender equality and the spread of infectious diseases (see Box 1.1). A target within the fourth Millennium Development Goal is to reduce child mortality by two-thirds between 1990 and 2015[37], but only 16 of the 68 priority countries are on track to meet this target[38]. A focus on interventions that address the neonatal mortality component of under-five mortality is necessary if this trajectory is to change at all. Although the relationship between neonatal mortality and under-five mortality is demonstrable, the absence of specific targets to cut neonatal mortality within the fourth Millennium Development Goal has been commented upon[39].

Box 1.1: Summary of the Millennium Development Goals[40]

1. *Reduce extreme poverty and hunger by half relative to 1990*
2. *Achieve universal primary education*
3. *Promote gender equality and empowerment of women*
4. *Reduce child mortality by two thirds relative to 1990*
5. *Improve maternal health, including reducing maternal mortality by three-quarters relative to 1990*
6. *Prevent the spread of HIV/AIDS, malaria, and other diseases*
7. *Ensure environmental sustainability*
8. *Develop a global partnership for development*

Source: Sachs JD, McArthur JW. **The Millennium Project: a plan for meeting the Millennium Development Goals.** Lancet 2005;365:347-53.

Strategies to achieve the fifth Millennium Development Goal, which includes the target of reducing maternal mortality by three-quarters between 1990 and 2015, draw upon a similar body of knowledge as strategies for MDG4. It has also been noted that interventions related to the nutritional and environmental MDGs (goals 1 and 7 in Box 1.1) are integral to reducing under-five and neonatal mortality[41].

1.1.2 Challenges to and strategies for reducing neonatal mortality

Demographic debate in the 1980s and 1990s, about trends and causes of stagnating declines in under-five mortality in developing countries, often did not mention neonatal mortality [for example[34,42,43]], and reducing early neonatal mortality has not always been a priority for Ministries of Health in developing countries for fear that the interventions required are too technological or costly[44].

However, debate on perinatal and neonatal mortality has moved from relative obscurity to a more central position, with high-profile advocacy and a growing realisation that neonatal mortality rates could be substantially reduced by simple, known, sustainable and cost-effective interventions, often during the perinatal period, that are scalable and available at the village or district hospital level[30]. The Lancet Neonatal Survival Series of 2005[11,39,45,46], and associated articles[47-49], exemplify this position.

There continue to be inequitable imbalances in health outcomes and healthcare provision in the developing world. Several approaches illustrate this point: the gap between rich and poor countries is widening as neonatal mortality is 6.5 times lower in high-income countries than in other countries[50]. The majority of births and subsequent neonatal and maternal deaths take place in the home[51,52], and neonatal care is not available to most populations in developing countries because facilities for neonatal care are often inaccessible to rural populations[53]. Coverage of antenatal care and skilled birth attendance show a marked differential between the wealthiest 20% and poorest 20% of developing populations, both in sub-Saharan Africa and south Asia[46]. The gap in under-five mortality between rich and poor populations, within and between countries, has widened over the past four decades[14]. There is evidence from Nepal to suggest that financial incentives to encourage mothers to seek professional care at childbirth disproportionately benefit wealthier households who were likely to already be using maternity services[54], although such an approach may work elsewhere. One of the reasons that the Millennium Development Goal to reduce child mortality is unlikely to be achieved in more countries may be that safer motherhood and newborn care programmes often emphasize interventions that do not reach the poorest households[51]. If this

information is coupled with the inequities in neonatal survival that have been described, then the inverse care law[55] - where availability of medical care tends to vary inversely with population need – can be seen to apply to the international context as it does to England and Wales where the concept was formulated.

These inequities and difficulties in access accentuate the need to identify strategies that are effective within the community, which can achieve universal coverage, and which to do not necessarily involve skilled obstetric care in health facilities or high technology. While facility-based components are important, it has been argued that approaches to improve maternal and child health must also include the level of the community[56]. Strategies involving breastfeeding (including exclusive breastfeeding and the early initiation of breastfeeding) tend to fit these requirements while being scalable.

In the second paper of the Lancet's 2005 Neonatal Survival Series, Darmstadt et al. estimated that up to two-thirds of neonatal deaths could be avoided with such low-cost interventions, typically community-based[45]. They highlighted 16 interventions with known efficacy, with examples including folic acid supplementation before conception, tetanus toxoid immunisation during antenatal care and clean delivery practices during the intrapartum period (see Box 1.2 for full description). Promotion of breastfeeding was included in postpartum care and was among the few interventions deemed to be effective and undisputedly feasible for large-scale implementation based on effectiveness trials. In settings with high NMRs and limited resources, an initial emphasis on community-based interventions could make a substantial impact at minimal cost. In later work, the same team estimated that increasing coverage of these 16 interventions to 90% in South Asia could save 0.59-1.08 million lives annually at an additional cost of approximately US$1600 per death avoided[57]. An assessment of the cost-effectiveness of different combinations of intervention packages, in terms of the number of disability-adjusted life years (DALYs) saved, included support for breastfeeding mothers coupled with community based management of neonatal pneumonia amongst the packages with the highest ratio of benefit to cost[58]. Identifying interventions that affect child morbidity and mortality through a nutritional pathway, the third paper of the Lancet's Maternal and Child Undernutrition Series found promotion of exclusive breastfeeding to show evidence of benefit in all 36 countries reviewed[59].

Such known interventions and strategies can be conceptualised within a 'continuum of care' framework from the perspective of the individual[60], focusing on parts of a mother's lifecycle around pregnancy. Within this framework, interventions can be classified by the timeframe within which they become relevant; antenatal (and pre-pregnancy) care, intrapartum care, immediate newborn care and postpartum care for mother and newborn.

Although many simple interventions have been identified that could collectively prevent most neonatal deaths if widely implemented, there is still a need, and a widespread perception of a need, for further research into interventions and strategies in developing countries. In a survey of 131 academics and professionals with experience of working in developing settings, future research priorities were geared less towards high technology solutions, and major sources of focus included aspects of health systems and community development such as participation and empowerment interventions, as well as child health themes including new ways of vaccination and breastfeeding promotion[61].

However, research inequities continue, with less than 1% of recent published neonatal research applying to developing populations[47]. Few of these known interventions have been taken to scale by national governments, with neonatal health still attracting relatively little investment[13]; donor spending on activities related to maternal, newborn and child health was US$1990 million in 2004, or 2% of gross aid to developing countries[62]. This equates to US$3.1 per child in priority low-income countries. There is a large difference between estimating potential effectiveness, and practically implementing such strategies at scale, backed with appropriate funding. Challenges in scaling up health interventions to achieve universal coverage include the need for delivery methods specifically adapted to the local context, horizontal integration into local health systems, and provision of sufficient funding[63].

Strategies involving breastfeeding and promotion of breastfeeding are unique in that by their nature they overcome or minimise many of the issues of cost, technology and scaling up, and are accessible to all. Exclusive breastfeeding, early initiation of

breastfeeding, and potentially the further practice of not discarding first breastmilk that is explored later in the thesis, all have the potential to provide equitable benefit with minimal barriers.

Box 1.2: Interventions with substantial evidence for efficacy, by different time periods[45]

Preconception:

- *Folic acid supplementation*

Antenatal:

- *Tetanus toxoid immunisation*
- *Syphilis screening and treatment*
- *Pre-eclampsia and eclampsia prevention*
- *Intermittent presumptive treatment for malaria*
- *Detection and treatment of asymptomatic bacteriuria*

Intrapartum:

- *Antibiotics for preterm premature rupture of membranes*
- *Corticosteroids for preterm labour*
- *Detection and management of breech*
- *Labour surveillance for early diagnosis of complications*
- *Clean delivery practices*

Postnatal

- *Resuscitation of newborn infant*
- ***Breastfeeding***
- *Prevention and management of hypothermia*
- *Kangaroo mother care*
- *Community-based pneumonia case management*

Source: Darmstadt GL, Bhutta ZA, Cousens S, Adam T, Walker N, Bernis L. **Evidence-based, cost-effective interventions: how many newborn babies can we save?** Lancet 2005;365:347-53.

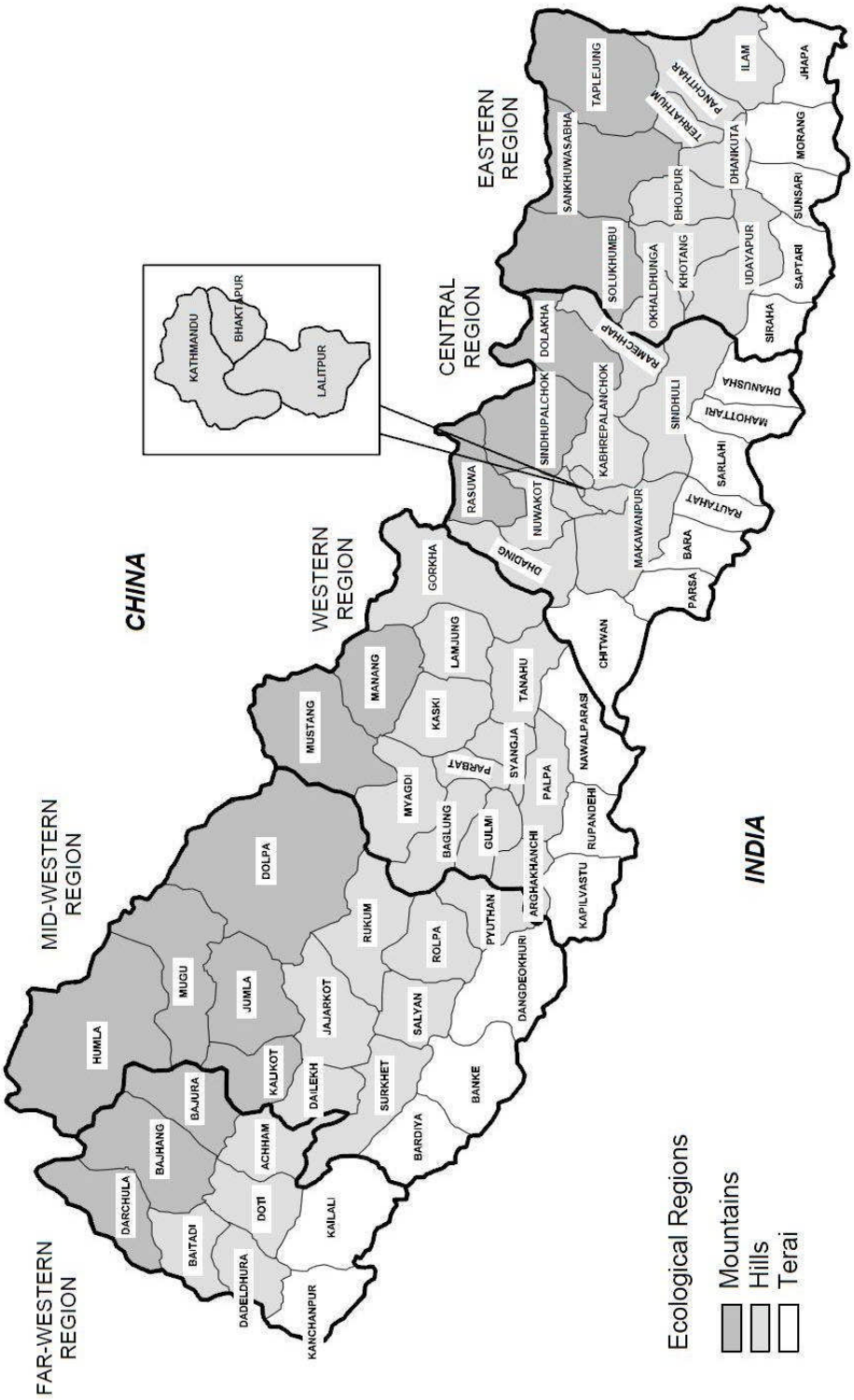
1.2 NEPAL

I begin this section with an overview of Nepal; its geography, recent history and the ethnic and cultural diversity of its population. I then focus on recent trends in mortality in Nepal in relation to the Millennium Development Goals, accompanied by a description of its healthcare system. The specific profiles of Makwanpur and Dhanusha, the two districts this investigation spans, are presented in Chapter 3.

1.2.1 Geography

Nepal is located between India and China, sandwiched between the Himalayan mountain range to the north, and the Indo-Gangetic plains to the south (see Map 1.1). Landlocked, Nepal is approximately rectangular in shape and occupies an area from 26º 22' to 30º 27' north latitude and 80º 4' to 88º 12' east longitude. It has a total land area of 147 200 square kilometres, with a west-to-east length of 885 kilometres and a north-to-south width of 193 kilometres[7]. Nepal is located on the convergent border of two tectonic plates and is prone to earthquakes.

Map 1.1: Nepal overview



Source: *Ministry of Health and Population [Nepal], New ERA, and Macro International Inc. 2007.* ***Nepal Demographic and Health Survey 2006****. Kathmandu, Nepal: Ministry of Health and Population, New ERA, and Macro International Inc.*

Three ecological zones run in bands across Nepal. Starting from the Indo-Gangetic plains to the south, and the area of lowest altitude, is the *Terai.* Relatively flat and fertile with alluvial soil, and lying below altitudes of 600 metres, this region is home to 48% of the population of Nepal despite occupying only 34,000 square kilometres or 23% of the land area[64]. Transport is relatively easy in the *Terai* because of the flat topography.

North of the *Terai* is the hill area, ranging from 600 to approximately 3,000 metres above sea level, which includes the urbanised Kathmandu valley. Still densely populated, approximately 44% of the population occupy this zone which covers 42% of Nepal's total land area at 61,000 square kilometres[64]. The hill regions also include the historical, cultural and political centres of Nepal. The northernmost topographical band of Nepal is the mountainous zone. This comprises mountain ranges that include Mount Everest at 8,850 metres above sea level. Despite covering a land area of 52,000 square kilometres, only approximately 7% of Nepal's population lives in this zone. Transportation, communication and industrial potential are all limited due to the challenging topography.

Monsoon weather patterns punctuate annual climactic patterns in the three ecological zones, with precipitation at a peak from June to September annually. The additional rainfall over the monsoon season shapes access within many regions of Nepal; some communications cease to be usable, and some communities and individual households become isolated by the water levels. The annual mean rainfall is approximately 1500 millimetres[64]. Unsurprisingly, temperatures in the low-altitude *Terai* are typically in a warmer range than that of the hill and mountainous bands. Temperatures can drop significantly below freezing point in the mountainous zone, whereas temperatures in excess of 40°C are encountered in the *Terai* depending on season.

For administrative purposes, Nepal is divided into a series of regions, sub-regions and smaller denominations of area. Spanning five regions (Far-Western, Mid-Western, Western, Central and Eastern) there are 75 administrative districts. Districts are divided into smaller units called Village Development Committees (VDCs) and municipalities. These are further divided into wards, with nine wards per VDC.

1.2.2 Population

Nepal's current total population is estimated to be approximately 29 million[12,65], with a roughly equal sex ratio[12]. The most recent Nepal census of 2001 reported a population of 23.2 million[66], with growth occurring since then at over 2% annually. The capital and largest city is Kathmandu. Although the census of 2001 recorded nearly 700,000 inhabitants in Kathmandu[66], its current population is now likely to be approximately one million, in part due to migration in the past decade. The currency of Nepal is the Nepalese rupee (NPR), which since 1993 has been pegged against the Indian rupee at rate of 1.6 Nepalese rupees to one Indian rupee. At the time of writing, currency exchange from GBP to NPR was one pound to 110.8 Nepalese rupees[67].

Nepal conducts population censuses every ten years, with the next due in 2011. Table 1.2 shows a series of basic population indicators drawn from the three most recent censuses of 1981, 1991 and 2001[7,68]. It can be seen that over the last three decades, Nepal has nearly doubled in population from 15 to 29 million and has experienced significant increases in life expectancy. However, although the country has urbanised somewhat, the majority of the population is still rural.

Table 1.2: Basic population indicators of Nepal[7,68]

	1981	1991	2001
Population (millions)	15.0	18.5	23.2
Intercensal growth rate (percent)	2.6	2.1	2.2
Density (population/km^2)	102	126	157
Urban percent	6.4	9.2	13.9
Life expectancy (years)			
Male	50.9	55.0	60.1
Female	48.1	53.5	60.7

Sources: Ministry of Health and Population [Nepal], New ERA, Macro International Inc. (2007); Central Bureau of Statistics [Nepal] (2003)

Such population trends have been accompanied by a general decline in fertility; Nepal's Total Fertility Rate (TFR) was 4.6 in 1996[69], 4.1 in 2001[70], and 3.1 in 2006[7]. TFR describes the number of children that an average woman would be expected to have if she followed a trajectory through current age-specific fertility rates of the population. Nepal's TFR may be only marginally above replacement level (approximately 2.1) by the time of the next census and DHS in 2011 if recent trends continue. Explanations for this pattern may include long birth intervals, in part caused by the long median period of breastfeeding in Nepal (34 months) and the corresponding long period of post-partum insusceptibility (10.5 months)[7]. Despite recent declines in fertility, Nepal is a young country, with over half of the population aged under 19 years in the 2001 national census[71].

1.2.3 People of Nepal

The population of Nepal is characterised by its diversity. The official language and mother tongue of approximately half the population is Nepali. Closely related to Hindi, deriving from Sanskrit and written in Devanagari script, Nepali is recognisably part of the Indo-European language family. However, the 2001 census identified a total of 92 languages in Nepal[71], many of which are of Tibeto-Burman or Mongolian origin. Maithili and Bhojpuri are the next two most common languages, with 12% and 8% respectively spoken as the mother tongue. Other notable languages, spoken by more than 1% of the population, include Tharu, Tamang, Newari, Magar, Awadhi, Rai, Limbu and Bajjika.

This linguistic diversity reflects the ethnic and cultural diversity of Nepal. Several words, such as "Tamang", "Newar", "Magar" or "Limbu", describe not only a language but often an ethnicity and a set of cultural distinctions, as well as an association with a certain geographical area of the country[72]. For example, the Newars are typically centred in the Kathmandu valley, Tamangs are the predominant group in the districts surrounding the Kathmandu valley, and the Rai

and Limbu people are typically found in parts of the Eastern Development Region. Ethnic differentials in early childhood mortality have been described in Nepal, with Tamang, Gurung, Magar, Thakuri and Chhetri children significantly more likely to die before age two years compared to a Brahmin reference category[73].

Over 80% of Nepal's population are Hindu, and approximately 11% are Buddhist[71]. A further 4% are Muslim, with the remainder accounted for by Christianity and by spiritualities of specific groups, such as animism of the Chepang or Rai and Limbu Kirati Mundhum religion. The religions have in turn influenced each other somewhat.

Nepal's Hindu caste system defines to a large extent the distribution of political and economic power between the people of Nepal[74]. It includes Brahmins and Chhetris as priest and warrior high castes, respectively. Merchants and labourers occupy a lower position. Dalits or 'untouchables' may be considered to occupy the last band in Nepal's Hindu caste system, suffering from ongoing caste-based discrimination, particularly in the western regions of Nepal[74]. 'Janjati', or other indigenous populations typically of Tibeto-Burman descent, may be considered as non-caste but occupy a middle status. Of lower status are Muslims and foreigners. The influence of caste on social position and mobility in Nepal has been argued to be an importation of the last two centuries that did not feature in the Shaivistic Hinduism once native to Nepal[75]. Recent developments have been made in Janjati linguistic rights, gaining some recognition alongside Nepali in state affairs and usage in education[74].

1.2.4 History and recent politics

Nepal consisted of feudal states, replaced by oligarchic rule of the hereditary Rana prime ministers in 1847. This was in turn succeeded by a monarchy in 1951. Reforms in 1990 placed a separate prime minister as head of government, with the King remaining head of state in a constitutional monarchy[76].

Nepal suffered a decade-long civil war from 1996 to 2006 during a Maoist insurgency, in which 13,000 people are believed to have lost their lives and over 100,000 people were displaced. Such displacement may have accelerated migration to urban centres and affected fertility by separating couples for extended periods of time. The Maoist movement originated from a grass-roots level, building strength from rural populations on a foundation of disillusionment with the political system, caste discrimination and poverty. National and district level strikes often paralysed the country during this time, and many human rights abuses were committed by both government forces and Maoists. However, this period also may have arguably resulted to an extent in improved opportunities for women[77], as the Maoists recruited female fighters.

In 2001, during the civil war, there occurred the royal massacre in which the majority of the royal family were killed by one of the crown princes, who himself also later died. This resulted in succession by King Gyanendra. In 2005, King Gyanendra declared a national state of emergency, the government was dismissed and he assumed executive powers – a decision met with widespread protests and demands for the restoration of democracy[74]. The events that followed resulted in a popular uprising against the King in April and May 2006 whereby his autonomous rule was overthrown.

An election in April 2008 between seven parties followed. The Maoists won a majority, with Prachanda ('fierce one') elected as prime minister, and Ram Baran Yadav of the Nepali Congress party placed in the figurehead role of president. The newly formed government immediately passed a near-unanimous vote to abolish the monarchy, and Nepal became a republic.

However, tensions have re-emerged since. Under suspicions of Maoist motives to politicise the Nepali national army by placing Maoists in all positions of senior army command, Yadav refused to sign papers unilaterally presented by Prachanda to dismiss senior non-Maoist army officials. The result was a re-ignition of strikes and a stalemate in the Constituent Assembly as Maoist politicians disrupted all meetings in the houses of parliament, and Maoists and non-Maoists alike have accused each other of adopting subversive tactics. Prachanda resigned. In the latter half of 2009, the next largest parties after the Maoists, the United Marxist-Leninists and Nepali

Congress, formed a new coalition government together under a new prime minister, Madhav Kumar Nepal. This coalition attempted to exclude the Maoists and required the cooperation of the fractious smaller parties associated with specific ethnic rights in the *Terai*. The current situation is fragile and dynamic, with the potential to return to civil war.

The impact of the civil conflict on women's access to obstetric care has been documented, accompanied by reports of health personnel leaving their posts after Maoist harassment[78]. The effect that such disruption had on data collection relevant to the thesis will be addressed in later sections of the thesis.

1.2.5 Economy

The recent conflict and political instability have prevented infrastructure development, even causing decline. Nepal remains one of the poorest and least developed countries in the world, with a ranking of 144 in the 2009 UN Human Development Index (HDI)[79], and 31% of its population (or 24% if World Bank definitions are used) lived below the poverty line in the fiscal year 2003/04[80]. Aggregate poverty figures hide regional inequalities; 35% of the rural population live below the poverty line, compared to 10% of the urban population[80]. The percentage of poor is elevated amongst marginalised groups, with the figure rising to 46% amongst Dalits and 41% amongst Muslims[80]. Nepal's gross domestic product (GDP) per capita was most recently estimated at US$471[81]. The majority of the population (approximately 80%) gain their livelihood from agriculture, although agricultural production only accounts for 32% of GDP[80]. Tourism and remittances from relatives working abroad also make a significant contribution to the Nepali economy, with Nepal receiving an average total of approximately ten million pounds per day in remittances[74].

With access to the Himalayan mountain range, Nepal has a great capacity for hydroelectric power generation and theoretically there is the potential to sell excess

energy to its rapidly industrialising neighbours, India and China. However, future dam projects are not forthcoming and existing dams are in poor repair and decline. The result is that Nepal is forced to ration its electricity, with many areas experiencing hours of scheduled power cuts per day, damaging industry and commerce. Nepal's landlocked location, continuing lack of political coherence and strikes, poor rural accessibility, its susceptibility to natural disaster, and its proximity to some of India's poorest states (Bihar and Uttar Pradesh), all limit current development potential.

1.2.6 Status of women

Although there is variability across groups in Nepal, women are in general not accorded the same status as men. Representation of women in political parties is low[74]. Marriage is typically patrilocal, and heredity and inheritance patrilineal. Women leave their *maiti* (parental home) upon marriage to live in their new *ghar* (affinal family home), making them a relative stranger and isolated in their new home. In the new household they are accorded junior status, often partially alleviated once they give birth to a son. Worthy of particular note is the typically dominant relationship of the mother-in-law (*sasu*) to the newly-wed woman.

More than half of women aged 15-49 have never been to school, compared to one in five men[7]. Four fifths of Nepali men are literate, compared to approximately half of women[7]. As indicated in Table 1.2, the life expectancy of women is only marginally greater than that of men, which is an anomalous statistic in comparison to other countries, and women's life expectancy was significantly less than men's in preceding decades[7,68]. Gender bias, sex preference for sons and sex-selective abortion in some communities of India have been documented[82]. While sex ratios at birth in Nepal do not generally discriminate against girls to the same extent, sex preference is apparent through other indicators. Mothers are more likely to desire no more children after having a son – in a study of women who said they had completed their families, sex ratio at last birth was 146 males per 100 females,

demonstrating a tendency for son-determined stopping behaviour - and mortality ratios favour males in children aged 1-4[83].

Women undergoing menstruation or giving birth are considered to be in a state of ritual pollution (*jhutto*). In many communities this results in seclusion of women to peripheral areas of the household at a time of vulnerability – traditionally this peripheral area would be the household animal shed or equivalent - and limits the ability to communicate problems[84]. This pattern broadly applies across ethnic groups in Nepal but may be more closely observed by certain Hindu castes than others.

However, there may be reasons for optimism. 2002 saw the passing of bills that legalised abortion in Nepal and expanded women's property rights, with such changes reported to be widely known and positively regarded amongst the population[85]. Son preference may be decreasing as perceived female earning potential increases[86]. And there is a trend of improving education and literacy in younger generations of women, with women aged 15-19 four times as likely to be literate as women aged 45-49. Table 1.3 shows by age group the proportion of women who have received secondary or higher education, and literacy rates[7].

Table 1.3: Literacy of women in Nepal, 2006[7]

Age group	Percentage secondary school or higher	Percentage literate [a]
15-19	53.6	79.7
20-24	42.0	69.8
25-29	27.6	54.4
30-34	20.7	49.3
35-39	11.4	38.3
40-44	7.2	26.2
45-49	3.6	18.4

[a] Defined as a woman who attended secondary education or higher and can read a whole or part of a sentence.

1.2.7 Nepal's health system

Nepal integrates primary care facilities into a hierarchical structure of health services. Central and Regional hospitals constitute the tertiary level while Zonal and District hospitals make up the secondary level. These act as hubs for a referral network of Primary Health Care Centres (PHC-Cs), Health Posts (HPs) and Sub-health Posts (SHPs) at district level, with each level acting as a referral point for the one below. These health services have been complemented by the more recent founding of private institutions including nursing homes, private hospitals and medical college teaching hospitals[87]. In addition, each district contains a high concentration of private medical shops and itinerant medical sales-persons providing care with varying skill levels ranging from untrained to auxiliary health worker levels. Table 1.4 shows the breakdown of health service facilities in 2003[88]. There is roughly one health facility per VDC. Institutional problems within this referral network include absenteeism, minimal staff support with unwelcoming staff attitudes and behaviour, lack of medicines and equipment, and inefficiencies in referral[89].

Sub-health posts often act as a first referral point for traditional birth attendants (TBAs) and female community health volunteers (FCHVs) and as a location for community-based activities, although the Nepali government no longer supports linkages between health facilities and TBAs. FCHVs are supervised by Village Health Workers (VHWs), and play a critical role in Nepal's community-based health initiatives, often supported by NGOs. These activities include supporting immunisation, and distribution of supplements for pregnant and postpartum women and children, contraception and oral rehydration salts[90]. TBAs are still involved in maternal and infant healthcare but their coverage is not universal and government support has been withdrawn. In 2001, there were 42 427 FCHVs and 12 682 TBAs, in contrast to 922 doctors (including dental surgeons), 1160 nurses, 4659 Auxiliary Health Workers (AHW), 1601 Assistant Nurse Midwives (ANM) and 3176 Maternal and Child Health Workers (MCHW)[87]. Other community health care providers include traditional healers, ayurvedic practitioners, owners of medicine shops, itinerant medicine sellers and 'village practitioners' (many of whom may be

untrained and medically unqualified). 22 District-level *Ayurveda Swastha Kendras* and 161 *Ayurveda Ausadhalaya* (dispensaries) were identified in 2001[87].

Table 1.4: Health service facilities (public and private), 2003[88]

Type of Facility	Number	Total Beds
Public Sector		
Long-stay specialty hospitals	5	275
Regional/Central/Teaching hospitals *(central and regional level)*	10	1860
Zonal hospitals *(zonal level)*	10	720
District hospitals *(district level)*	67[a]	1030
Health Centres with beds *(constituency level)*	191	573
Health Posts	701	-
Sub-health Posts *(VDC level)*	3159	-
PHC outreach clinics *(community level)*	13700	-
Total	**17776**	**4458**
Private Sector		
Specialist/NGO/Mission	123	3804
Overall health sector total	**17899**	**8262**

[a] Three District hospitals were under construction when source was published. It is expected that the majority of Districts now contain a District hospital.

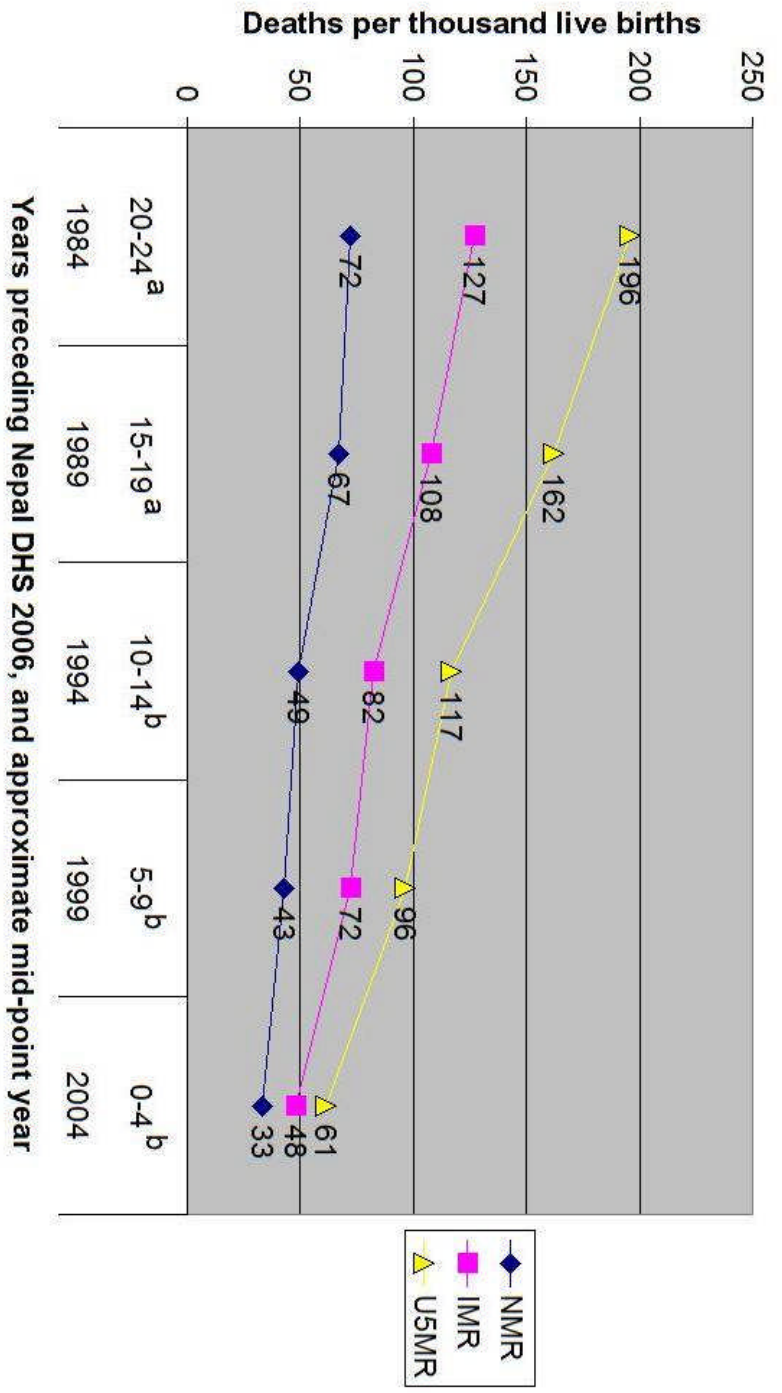
The 2006 Nepal DHS indicates that 81% of births take place at home and only 18% take place in a health facility[7], highlighting the importance of community-based approaches to healthcare. Trained attendance at birth is uncommon[89], with the 2006 Nepal DHS reporting that 19% of deliveries are assisted by skilled birth attendants (SBAs - doctors, nurses, health assistants or midwives)[7].

1.2.8 Neonatal survival in Nepal

Based on the Nepal DHS 2006[7], which provides one of the more reliable national estimates of mortality rates, Nepal had a NMR of 33 per thousand live births. This is slightly lower than the NMRs identified for other south Asian countries in Table 1.1 on page 24. The figure is based on a recall of pregnancies in the five years preceding 2006. Figure 1.4 demonstrates a trend of declining childhood mortality rates since the 1980s, and a convergence of NMR, IMR and U5MR[7,69]. Based upon a U5MR of 61 and NMR of 33, approximately 54% of under-five deaths occur in the neonatal period. With reference to comparisons made by Black et al.[10], shown in Figure 1.3, Nepal has a profile of somewhat reduced mortality, with neonatal deaths accounting for a relatively large proportion of under-five deaths. Strategies that address neonatal survival in Nepal are therefore especially critical.

With a target U5MR of 47 by the year 2015, Nepal is one of only 16 priority countries 'on track' to meet its MDG4 targets[38]. The most common causes of neonatal deaths were identified in the Nepal DHS 2006 as birth injury (19%), acute respiratory infection (ARI) (18%), birth asphyxia (15%) and other serious infections including possible ARI and possible diarrhoea (21%), based on analysis of 475 verbal autopsy (VA) questionnaires[7]. However, complications associated with prematurity have been measured as a more major contributor to neonatal mortality (20%) in earlier WHO estimates[91]. Such estimates must be interpreted judiciously, in light of the difficulties of classifying causes of neonatal death, due to the predominance of home births, non-specific diagnostic indicators, and a reliance on hospital data. Despite such difficulties in measurement, it is apparent that a significant proportion of neonatal deaths in Nepal are due to preventable causes.

Figure 1.4: Converging neonatal, infant and child mortality rates in Nepal since 1984[7,69]



[a] Data source: Nepal Family Health Survey 1996[69]

[b] Data source: Nepal Demographic and Health Survey 2006[7]

Several key points from this overview of Nepal put the importance of the investigation of the thesis in context. The majority of the country is rural-dwelling, with primary care accessed at the community level. The majority of births occur at home without skilled attendance. Women tend to give birth in relatively high-risk marginal settings with a lack of support. Trends in development, access and governmental control indicate that this situation is unlikely to change in the near future. Neonatal mortality accounts for a large proportion of under-five mortality, with many deaths attributable to preventable causes. Equitable community-based strategies to improve newborn health and survival are particularly relevant in this context - and I address early infant feeding in the following section.

1.3 EARLY INFANT FEEDING

There are a number of aspects or dimensions of early infant feeding that have been identified and investigated, and for which recommendations have been developed to maximise infant or neonatal survival and health. These are:

- *any breastfeeding*
- *established breastfeeding: exclusive compared to predominant and partial breastfeeding* [a]
- *the giving of prelacteal feeds* [a]
- *breastfeeding initiation time*

In this section, I present existing evidence and recommendations developed for each of these aspects of early infant feeding in developing country settings. I focus this review on studies that consider mortality and morbidity outcomes in the neonatal period. However, I also include studies that describe outcomes in the infant period (or early months of the infant period) where relevant. I then suggest a further dimension of early infant feeding: discarding of first milk.

[a] *See definitions section of thesis*

Note: Duration of breastfeeding falls beyond the scope of the thesis and will not be explored in this section.

1.3.1 Issues when interpreting evidence in early infant feeding

When considering aspects of early infant feeding, such as any breastfeeding compared to no breastfeeding, several methodological issues exist that mean results must be interpreted with caution. Despite being widely regarded as a gold standard in epidemiology, randomised controlled trials (RCTs) suffer from instances in which their application is unfeasible, unethical or impractical[92]. Studies on early infant feeding are rarely conducted as RCTs for a number of reasons – it would be unethical to assign a mother and infant to a control group in which the mother is instructed to adopt a practice believed to be harmful, participants may refuse to participate, small but real differences in morbidity or mortality risk may only be detectable with sample sizes too large for an affordable RCT, and prohibitively sophisticated study designs would be required when investigating multiple risk factors in one trial, such as several aspects of early infant feeding.

Evidence on early infant feeding and associated morbidity or mortality is largely derived from observational studies, which present a number of generic difficulties in limiting bias and confounding, and when inferring causation. Some specific challenges are raised by investigation of early infant feeding practices. Sometimes there are few infants in a particular group, such as those who are not breastfed, and infants coming under such a category may be in other ways non-comparable to infants in other groups, such as those receiving breastmilk[93]. A further challenge is that early infant feeding practices can be influenced by the same factors that influence risk of mortality – for example, low birth weight (LBW) infants are less likely to breastfeed than infants born at normal birth weight[94]. Reverse causality – where illness affects breastfeeding status – is another methodological cause for concern[95], and studies do not always adequately control for possible confounding variables. These methodological issues are of direct relevance to the investigation in the thesis and are explored in greater detail in Chapter 2, but should be kept in mind when reviewing the evidence presented in the current section.

When interpreting and synthesizing reports of effects of early infant feeding practices on mortality and morbidity outcomes, further issues are the lack of consistency in definitions between studies and agencies[96], the lack of clear

definitions used within studies, or variation in estimation methods. For example, when describing “breastfeeding”, authors often do not comment upon the extent of exclusivity[97], limiting comparability between studies. Additionally, there are a number of ways in which exclusive or partial breastfeeding can be measured, including recall of foods and liquids consumed in the previous day, frequency of consumption of different foods and drinks within a given preceding time period, or recall of what has ever been fed.

1.3.2 Methodology used for early infant feeding literature search and review

This review aims to describe existing dimensions of early infant feeding and their impact on neonatal mortality and morbidity outcomes in developing contexts, including current recommendations, evidence with regard to early infant mortality and morbidity outcomes, current prevalence of different feeding practices, and where relevant and substantial, a description of selected strategies promoting a given positive aspect of early infant feeding or factors affecting the likelihood of its practice. For outcomes in the neonatal period, the review aimed to consider all available published data relevant to infants born at term. For outcomes in the infant period, selected papers are presented based on their relevance to developing country settings, how recently they were published, their comparability with other existing papers (especially in definitions used), the number of citations, sample size and study design, and the extent to which inference could be made about neonatal outcomes (for example if a study provided results for the first two months of infancy). The review does not aim to be exhaustive in this respect. Similarly, the review aims to describe the nature of key existing early infant feeding promotion strategies – including some evidence from poor communities in developed countries – without providing an exhaustive list of all potential evidence. Studies focusing on HIV transmission risk were not included because it is not currently as widespread an issue for infant survival in Nepal as in some regions of sub-Saharan Africa (the first case of AIDS was reported in Nepal in 1998), although its prevalence in Nepal is rapidly increasing[98]. All searches were limited to studies carried out after 1970. Current statistics on early infant feeding practices in selected countries of south

Asia and sub-Saharan Africa were derived from Demographic and Health Surveys (www.measuredhs.com).

The search methodology included review of the following sources of information with a range of search terms, some examples of which were ‘breastfeeding initiation “neonatal mortality”’, ‘prelacteal feed “neonatal mortality”’ and ‘exclusive breastfeeding “neonatal mortality”’:

- Google Scholar electronic reference library (http://scholar.google.co.uk/), including usage of ‘Cited by…’ and ‘Related articles’ functions when relevant articles were found.
- PubMed electronic reference library (http://www.ncbi.nlm.nih.gov/).
- Scopus electronic reference library (http://www.scopus.com/home.url).
- Manual searching of bibliographies of relevant papers as they were located.
- Manual searching of bibliographies of pertinent existing reviews[99-104], theses[105], and books[106,107], complemented by use of Google Scholar’s ‘Cited by…’ and ‘Related articles’ functions as relevant references were identified.

In total, 41 studies were selected (see Appendix A). The studies were categorised by the dimension of early infant feeding they address (some studies supply data applicable to several dimensions), and sub-categorised by whether outcomes concerned mortality or morbidity outcomes, or whether a study described a breastfeeding promotion strategy. The studies discussed in this review are summarised in Appendix A in a format corresponding to their categorisation. The research presented in this review is orientated by further background and discussion where necessary.

1.3.3 Any breastfeeding

Breastfeeding is widely recognised as a foundational component of care and feeding for newborn infants, promoted by a number of high profile pro-breastfeeding organisations worldwide such as La Leche League, and reflected in national health policies designed to promote breastfeeding, the Innocenti Declaration jointly adopted by WHO and UNICEF in 1990[108], and UNICEF's Baby-Friendly Hospital Initiative[109]. While breastfeeding also confers wider benefits including amenorrhea and child spacing[110], and potentially reduced risk of maternal haemorrhage[111], the content of this sub-section focuses on neonatal and early infant mortality and morbidity in never breastfed compared to breastfed infants, often using exclusively breastfeeding groups as a reference category where practices are not grouped by 'any breastfeeding'. 15 studies were selected in this section of the review, of which five related to mortality outcomes and ten related to morbidity outcomes (Appendix A, Section A for study summaries).

No breastfeeding and infant and early childhood mortality. The absence of any breastfeeding has been shown to increase the risk of all-cause and cause-specific mortality in earlier months of the infant period. A large WHO pooled analysis of data from six developing countries demonstrated an overall increase in survival in breastfed infants, and showed that the protection against all-cause mortality granted by breastfeeding declines as an infant ages, with infants under two months of age experiencing the greatest impact on mortality risk if not breastfed[95]. In an investigation of a range of risk factors for early childhood mortality (between birth and second birthday) in Nepal[73], breastfed children were found to have a quarter of the risk of mortality by age two compared to children not breastfed (including weaned children who breastfed at a younger age).

No breastfeeding and cause-specific infant mortality. Mortality attributable to diarrhoea and respiratory causes has been examined separately. In a Brazilian study over two decades ago, lack of any breastfeeding, replaced by formula or cow's milk, was shown to increase risk of infant mortality attributable to diarrhoea by 14 times and respiratory infections by nearly four times compared to exclusively breastfed infants[112,113]. Similarly, a Philippino study has described nearly a tenfold

increase in diarrhoeal mortality in infants under six months of age who cease breastfeeding or fail to initiate, although an insignificant association was found with acute lower respiratory infection mortality[114]. This study made no distinction between exclusive and partial breastfeeding.

No breastfeeding and infant morbidity outcomes. Lack of any breastfeeding has also been associated in developing settings with increased risk of morbidity due to respiratory infections or diarrhoea as a primary outcome. In an extensive review of 35 studies from 14 countries (including developed and developing countries) by Feachem and Koblinsky in 1984[115], 76% of the reviewed studies were reported to describe a protective effect of partial breastfeeding compared to no breastfeeding on risk of morbidity from diarrhoea, with the benefit greatest for infants ages 0-2 months and declining for later ages, corroborating the findings of the WHO pooled analysis described above. Several studies in developing settings have since compared any breastfeeding with no breastfeeding and identified an effect on risk of diarrhoea[116-119], and respiratory infections[120-122], in children under one year of age, with greatest effects observed in the first months of life. The findings from the Brazilian study cited in the previous paragraph were later supplemented by results from the same area of south Brazil showing that infants not breastfed, and aged less than three months, were at 60 times greater risk of admission to hospital for pneumonia than infants breastfed and without formula[123]. In a hospital-based case-control study in Lahore, Pakistan, infants receiving animal milk or formula only were at 18 times the risk of displaying signs of neonatal septicaemia compared to partially breastfed infants[124].

However, the prevalence of any breastfeeding is high and is almost universal in many countries. Table 1.5 indicates that the prevalence of any breastfeeding for the first two months of an infant's life is above 95% in nearly all countries listed. In developing settings, absence of any breastfeeding per se may not be as pressing an issue as more nuanced aspects of early infant feeding, such as what other liquids or solids are fed in addition to breastmilk, if any.

Table 1.5: Prevalence of any breastfeeding in selected countries, infant aged under two months – DHS data from selected developing countries [a]. Results describe preceding 0-4 years.

Location	DHS Year	% Currently breastfeeding, age <2 months
Sub-Saharan Africa		
Dem. Rep. of the Congo[16]	2007	100
Ghana[17]	2008	100
Namibia[19]	2006/7	86
Nigeria[20]	2008	97
Sierra Leone[21]	2008	95
Uganda[22]	2006	100
Zambia[23]	2007	100
Zimbabwe[24]	2005/6	98
South Asia		
Bangladesh[25]	2007	100
India[26]	2005/6	97
Nepal[7]	2006	99
Pakistan[27]	2006/7	97

[a] DHS surveys obtained from www.measuredhs.com

1.3.4 Established breastfeeding: exclusive, predominant and partial breastfeeding

Exclusive breastfeeding for six months is considered to be one of the most effective interventions to achieve MDG-4[125], in line with the WHO 2001 recommendation that exclusive breastfeeding continues for six months[126,127]. Several studies have demonstrated an association between exclusive breastfeeding and reduced risk of mortality compared to predominant and partial breastfeeding in the infant and early childhood periods. Relatively few studies have specifically focused on neonatal outcomes. A further difficulty of interpreting and comparing evidence on exclusive, predominant and partial breastfeeding is that a distinction between current feeding status and whether exclusive breastfeeding occurred from birth is not always

made[128]. 15 studies were selected in this section of the review. Nine of the studies were descriptive, of which six related to mortality outcomes and three related to morbidity outcomes. Six studies addressed interventional strategies for exclusive breastfeeding promotion (see Appendix A, Sections B1 and B2 for summaries).

Established breastfeeding and infant mortality risk. Exclusive breastfeeding offers the most protection from infectious disease morbidity and mortality, followed by predominant, partial and no breastfeeding, although significant differences are not always detected between exclusive and predominant breastfeeding. Several studies from developing settings demonstrate this effect in the infant period, with some studies presenting results for the first months of the infant period. A cohort study of 1677 infants in Dhaka, Bangladesh, found that non-exclusive breastfeeding (including partial and no breastfeeding) resulted in a more than twofold increased risk of death from acute respiratory infection (ARI), and nearly fourfold increased risk of death from diarrhoea[129], with overall a twofold increased risk of all-cause mortality, when compared to exclusive breastfeeding and after adjusting for confounding variables. A significant difference in mortality risk between exclusive and predominant breastfeeding was not detected. Similarly, a multicentre cohort study analysing data from Ghana, India and Peru found no significant difference between exclusive breastfeeding and predominant breastfeeding in risk of death in children aged six weeks to five months[130]. However, there was a significant difference between partially breastfed and predominantly breastfed infants in all-cause and diarrhoea-specific mortality, and it has been argued that a protective effect of exclusive breastfeeding compared with predominant breastfeeding may have been detected in the neonatal period if the study was able to include infants less than six weeks of age[131]. Research from Peru showed that risk of infection incrementally increases in predominant and partially breastfed infants, in comparison to exclusive breastfeeding, from diarrhoea, skin infections and respiratory causes[120]. Although not classifying established breastfeeding behaviours according to ‘predominant’ or ‘partial’ breastfeeding, the work described earlier from south Brazil by Cesar Victora and colleagues also demonstrated an increased risk of infant mortality due to diarrhoea and respiratory infections when infants were fed breastmilk and formula milk, and when infants were fed breastmilk and cow’s milk[112]. After adjustment for several confounders, breastmilk fed with formula milk and breastmilk plus cow’s milk were both categories found to be significantly

associated with increased mortality risk from diarrhoea, with risk increased over threefold for both categories. An insignificant but suggestive association with mortality due to respiratory infections was observed after adjustment for confounding factors. Improvements in post-neonatal survival have also been observed in Chile[132], and Malaysia[133], for fully breastfed infants compared to partially breastfed infants.

Established breastfeeding and infant morbidity risk. Treating diarrhoeal incidence as a primary outcome measure, a prospective birth cohort study in rural Egypt observed significantly reduced rates of diarrhoea amongst exclusively breastfed infants under six months of age compared to those not breastfed (33% reduction), after adjustment for breastfeeding initiation time and other covariates including birth location, maternal education level, and selected asset ownership[134]. A protective effect of predominant and partial feeding (by definitions used in the thesis) as one grouped feeding category was suggestive but non-significant compared to no breastfeeding as a reference category. Similarly, the risk of diarrhoea in preceding seven-day intervals was observed to be two and a half times greater in non-exclusively compared to exclusively breastfed infants under six months of age (aOR 2.50 [1.10-5.69], p=0.03) in a rural Bangladeshi prospective cohort study[135]. The same study also described over twice the prevalence of ARI in non-exclusively compared to exclusively breastfed infants (aOR 2.31 [1.33-4.00], p<0.01). A hospital-based study in Guadalajara, Mexico, described a borderline protective effect of predominant breastfeeding compared to non-predominant breastfeeding (including partial breastfeeding and formula feeding combined) on gastrointestinal infection incidence (aOR 0.4 [0.2-1.0], p=0.04) in infants under six months of age[136].

Established breastfeeding and neonatal mortality risk. Two recent robust studies including investigation of established neonatal breastfeeding have focused on neonatal mortality as an outcome[137,138]. Analysing data collected as part of a wider cluster randomised trial in Ghana, with a sample size of 10 942 infants, Edmond and colleagues were able to compare exclusive, predominant and partial neonatal breastfeeding and its association with infection-specific mortality (including deaths attributable to meningitis, pneumonia and septicaemia) while controlling for a wide range of variables including prelacteal feeding and breastfeeding initiation

time[137]. The influence of reverse causality was limited by excluding neonatal deaths in the first two days postpartum. Partially breastfed infants were at nearly six times greater risk of neonatal mortality compared to exclusively breastfed infants, and the results were also suggestive of an increased risk of neonatal mortality in predominantly breastfed infants, although the findings were not significant. No relationship was observed between established neonatal breastfeeding and risk of non-infection specific neonatal mortality. In a similar fashion, Mullany and colleagues have demonstrated a comparable effect of established neonatal breastfeeding and risk of neonatal mortality[138]. They analysed data collected during a community-based randomised trial on the effect of two topical chlorhexadine interventions in a *Terai* district of Nepal, with an eligible sample size of 22 838. Many of the same steps to limit reverse causality were taken as in the study by Edmond and colleagues, confining analysis to breastfeeding initiators and to deaths only after the first two days postpartum. Partial breastfeeding was the most common form of established breastfeeding in this setting, and partially breastfed infants were at significantly increased risk (RR = 1.77 [1.32-2.39]) of all-cause neonatal mortality compared to those exclusively breastfed. However, the authors do not specify which potentially confounding variables, if any, were controlled for in their comparison of partial and exclusive breastfeeding, as the primary focus of their paper was on the impact of delayed breastfeeding initiation time, discussed in the thesis later. And unlike data presented by Edmond and colleagues, no information on risk by cause of death was available.

Breastfeeding promotion interventions and established breastfeeding outcomes. A number of successful programmes to increase rates of exclusive breastfeeding in developing and poor developed community settings have been advanced[99,139,140], with evidence from cluster-randomized trials showing increased exclusive breastfeeding and decreased incidence of gastrointestinal tract infections[141], and diarrhoea[142], in intervention clusters receiving breastfeeding promotion programmes. The odds of exclusive breastfeeding in the neonatal period are particularly increased by individual counselling[59], and a RCT in Ghana has demonstrated that breastfeeding education and individual counselling delivered by nurses and nutritionists in a hospital environment can be effective in increasing exclusive breastfeeding rates at six months postpartum[143]. For mothers who do not exclusively breastfeed despite having been counselled, contributing factors have

been highlighted in a Bangladeshi context that include a dominant mother-in-law, too much housework and lack of financial support from husbands[144].

Exclusive breastfeeding rates in the developing world increased by 15% in infants younger than four months in the decade between 1990 and 2000[145], with the largest improvement occurring in sub-Saharan Africa, although rates of exclusive breastfeeding in infants under six months are under 50% across South Asia and typically under 30% in sub-Saharan Africa[146,147]. As many as 1.45 million infant deaths in developing countries are attributable to sub-optimal established breastfeeding, based on estimates of population attributable fractions[148].

1.3.5 Prelacteal feeds

The range of prelacteal feeds can include infant formula, sugar water, plain water, cow or other animal milk, ghee (clarified butter), honey, fruit juice, mustard oil, herbal teas and other water-based and cow's milk-based solutions[135,142,149-151]. A WHO review on the evidence for ten steps to successful breastfeeding highlighted that newborn infants should not receive any food or drink other than breastmilk unless medically indicated[152]. Prelacteal feeding is believed to result in less stimulation of breastmilk production and to interfere with learning of suckling behaviour and later established breastfeeding patterns[153]. Prelacteal feeds are also potentially harmful because they may introduce infection[154], and prime the gut to abnormal protein antigens[155]. Reported consequences in infants given prelacteal feeds have included a risk of water deficit with respect to sodium and other solutes[156], and insufficient calcium and excessive phosphorus in cow's milk-based feeds[157]. Honey in particular has been identified as a potential source for infant botulism[158]. As indicated in Table 1.6, the percentage of newborn infants receiving a prelacteal feed ranges from 9% to 62% across selected developing countries, based on DHS surveys taken within the last five years. Seven studies were selected for this section of the review; three descriptive and four interventional (summarised in Appendix A, Sections C1 and C2).

Table 1.6: Percentage of newborn infants receiving a prelacteal feed [a] – DHS data from selected developing countries [b]. Results describe preceding 0-4 years.

Location	DHS Year	% Receiving prelacteal feed
Sub-Saharan Africa		
Dem. Rep. of the Congo[16]	2007	17.5
Ghana[17]	2008	18.1
Namibia[19]	2006/7	14.1
Nigeria[20]	2008	56.0
Sierra Leone[21]	2008	59.2
Uganda[22]	2006	54.0
Zambia[23]	2007	8.8
Zimbabwe[24]	2005/6	9.6
South Asia		
Bangladesh[25]	2007	62.2
India[26]	2005/6	57.2
Nepal[7]	**2006**	**36.5**
Pakistan[27]	2006/7	65.2

[a] Infants given something other than breastmilk during the first three days of life
[b] DHS surveys obtained from www.measuredhs.com

Prelacteal feeds and neonatal mortality. Relatively little evidence exists on a relationship between prelacteal feeding and neonatal mortality, not all studies identify a significant relationship, and certain prelacteal feeds (such as ghee) are geographically-specific; a study of prelacteal feeds in any given location will have limited external validity, and no study in south Asia was located in this literature review. Surveillance in a remote area of The Gambia, spanning a period of five years, highlighted a number of risk factors for neonatal mortality, including primiparity and prolonged labour, and prelacteal feeding was associated with a more than three-fold increased risk of late neonatal mortality (aOR 3.38 [1.44-7.93]) compared to infants receiving no prelacteal feeds[159]. Concerns over the effect of reverse causality in this study may be reduced because an association remained with mortality risk in specifically the late neonatal period, when the majority of

deaths were attributable to infection and not to perinatal problems such as prematurity or hypoxia. However, the authors acknowledge that the association between prelacteal feeding and late neonatal mortality risk may have been overestimated because infants born with problems may be treated differently. There was also no possibility to present odds ratios adjusted for other aspects of early infant feeding. Although not focusing on the neonatal period specifically, a further notable source of positive evidence comes from a prospective study from Egypt[149]. Prelacteal feeding was associated with increased diarrhoea incidence, though the relationship was only statistically significant for infants under three months of age.

Edmond and colleagues did not find a significant relationship between prelacteal feeds and infection-specific neonatal mortality risk when analysing the data from the Ghanaian ObaapaVitA trial, after adjustment[137]. Unadjusted odds ratios suggested a doubled risk of infection-specific neonatal mortality in infants who received prelacteal feeds compared to no prelacteal feeds, but the relationship was no longer significant after controlling for over 20 potentially confounding variables and when the model was refitted to exclude newborn infants at high risk of death. Edmond et al. do, however, mention observation of a somewhat increased risk of all-cause neonatal mortality amongst infants given prelacteal feeds in an earlier paper[160]. Over 70 percent of the prelacteal feeds in this Ghanaian context were water-based (water, tea, sugar in water, traditional herbs), nearly 20% were milk based (tinned milk, infant formula, cocoa mixed with tinned milk), and over 10% comprised solid foods (gruels, porridge, water with soaked bread)[105]. Different prelacteal feeds may affect neonatal mortality to differing extents, and local water quality is likely to affect the risk associated with water-based feeds. The results of Edmond et al. invite similar analyses in alternative settings.

Prelacteal feeds and subsequent breastfeeding outcomes. Despite the currently questionable link between prelacteal feeds and neonatal mortality, there is evidence to suggest that prelacteal feeding has a negative relationship with subsequent breastfeeding outcomes in the early infant period. In the Egyptian prospective study cited earlier[149], data was collected three or four days after birth and then in twice-weekly follow-up interviews, and a significant negative association was observed between prelacteal feeding and subsequent rates of exclusive breastfeeding in each period preceding a follow-up interview, in infants under three months. Logistic

regression analysis of data from the 1991/92 Honduras Epidemiology and Family Health Survey identified a negative association between water and cow's milk-based prelacteal feeds and exclusive breastfeeding, and water-based prelacteal feeds were associated with delayed initiation of breastfeeding (starting after 24 hours)[153]. Findings from a longitudinal study in Israel suggested that newborn infants who received prelacteal formula feeds were less likely to be fully breastfed at six weeks, with the greater the number of prelacteal feeds, the greater the likelihood of not breastfeeding[161]. However, a distinction may be made for formula prelacteal feeds compared to other prelacteal feeds, as many formula prelacteal feeds are bottle-fed and not spoon fed, which can lead to nipple confusion and latching problems, affecting longer-term breastfeeding outcomes[162].

Promotion interventions and prelacteal feeding outcomes. Several health worker training initiatives have resulted in reduced use of prelacteal feeds by new mothers in hospital settings[150,154,163], and prelacteal feeding was also halved in the intervention clusters of a cluster-randomized controlled trial designed to promote exclusive breastfeeding at a community level[142]. A recent community package of essential newborn care interventions, including breastfeeding promotion, in Uttar Pradesh, northern India, was found to decrease prelacteal feeding by over half in both intervention groups (essential newborn care and essential newborn care plus a hypothermia detection indicator) compared to control clusters[164].

1.3.6 Breastfeeding initiation time

Early initiation of breastfeeding may be expected to aid neonatal survival through a number of potential pathways, including prevention of dehydration and hypoglycaemia[165], improving later breastfeeding practices, improved resistance to and recovery from infection, and maternal warmth limiting hypothermia risk[160]. In particular, the content of early breastmilk – colostrum – suggests that early initiation is protective against infection. During the first two days postpartum a minimal amount of milk is produced, with volumes increasing after two to three days in the second stage of lactogenesis[166]. Colostrum contains elevated concentrations of

multiple antimicrobial proteins, including lactoferrin and immunoglobulins A and G[167]. These concepts are expanded later in the thesis, when considering the potential impact of discarding first milk.

13 studies were selected in this section of the review, of which three related to mortality outcomes, three described diarrhoeal incidence as a primary outcome, and seven were interventional studies for promoting the early initiation of breastfeeding (see Appendix A, Sections D1 and D2 for summaries).

Breastfeeding initiation time, neonatal mortality and child mortality. While exclusive breastfeeding until six months of age has been encouraged for over a decade[108,126], evidence and recommendations regarding early initiation of breastfeeding have received renewed and formalised attention more recently[168,169]. Key evidence was published by Edmond and colleagues in 2006[160]. Focusing on neonatal mortality as a study outcome, Edmond's analysis of data from a community-based cluster-randomized trial in rural Ghana showed a dose response of increasing neonatal mortality risk with delayed breastfeeding initiation time. A dose response relationship increases the plausibility of an association implying causation[133]. The analysis was based on a sample of 10 947 infants after exclusion of twins, breastfeeding non-initiators and mothers leaving the study region before conclusion of data collection, and only considering deaths from ages 2-28 days to limit the extent of reverse causality. Late initiators (infants starting breastfeeding after one day) were at nearly a threefold risk of neonatal mortality compared to those initiating within one hour (aOR 2.88 [1.87-4.42]) while there was a suggestive (but non-significant) increased risk of mortality for infants initiating between one hour and one day compared to those initiating within the first hour (aOR 1.43 [0.88-2.31]). Adjusted odds ratios were produced after controlling for a number of potential confounding factors including established breastfeeding pattern, infant sex, birth size, birth environment and number of antenatal care visits. Expressed as a population attributable fraction (PAF), the results suggested that 22% of all neonatal deaths in the study location could be avoided if all infants initiated breastfeeding in the first hour of life.

Mullany and colleagues presented similar results in 2008[138] from a *Terai* region of Nepal, further increasing emphasis on early initiation as a critical component of early infant feeding. Their analysis included a sample size of 22 838, only considered breastfed infants surviving to 48 hours, and mortality risk was adjusted for a number of potential confounders including maternal literacy, ethnicity and infant sex, but no other aspects of early infant feeding. Infants initiating breastfeeding more than 24 hours after birth were at significantly increased risk of neonatal mortality compared to those initiating within 24 hours (aOR 1.41 [1.08-1.86]). Estimating the effect separately by ethnicity, late initiators (starting after 24 hours) were at a threefold increased risk of mortality (aOR 3.00 [1.50-5.98]) in *Pahadi* households (groups originating from the hill regions of Nepal), whereas the increased mortality risk observed amongst *Madeshi* (indigenous to the *Terai*) late initiators was only marginal (aOR 1.32 [1.00-1.74]). Although Mullany et al. did not express their overall results in terms of a PAF to estimate how many neonatal deaths would be avoided if all infants initiated breastfeeding within the first 24 hours, based on the adjusted relative risks and relative proportions of early to late initiators they present, it can be calculated that 16.5% of neonatal deaths amongst infants initiating breastfeeding and surviving to 48 hours would have been avoided in the study population if all infants had initiated breastfeeding within 24 hours. The work of Edmond et al. and Mullany et al. strongly suggests that delayed initiation of breastfeeding increases risk of neonatal mortality, and invites replication and investigation into the events and reasons surrounding time to initiation.

An earlier investigation in Guinea-Bissau did not find a significant association between initiation of breastfeeding within the first day and survival from ages 28 days to three years, after adjustment for a number of covariates and exclusion of infants unwell on the day of birth[170]. However, this study included many child deaths at ages beyond those at which breastfeeding initiation time might be anticipated to affect survival, it suffered from a small sample size, and breastfeeding status was unknown for half of the cases of infant or child death, allowing analysis only to be based on 46 deaths.

Breastfeeding initiation time and infant morbidity outcomes. Several studies have taken risk of diarrhoeal incidence as a primary outcome measure when comparing infants by breastfeeding initiation time[134,171,172]. Data from a prospective

birth cohort in rural Egypt suggested that infants initiating breastfeeding early (defined by the authors as occurring in less than three days) are at a 26% reduced risk of diarrhoea from birth to six months of age compared to infants initiating after three days, after adjustment for established breastfeeding pattern (exclusive, partial and no breastfeeding) and a number of additional covariates including ownership of several assets, infant sex, maternal education, and birth site[134]. This analysis was particularly robust as different days of diarrhoeal incidence in each infant in the cohort were not assumed to be independent entities; generalized estimating equations (GEE) were used to adjust for intercorrelations between repeated observations. Two earlier studies have also found early initiation of breastfeeding to be significantly[171], or suggestively[172], associated with lower incidence of infant diarrhoea. A case-control study of male infants aged 6-36 months in disadvantaged areas of Karachi, Pakistan, found that reported initiation of breastfeeding on the first day of life was significantly more frequent amongst infants who had not experienced diarrhoea in the previous week, compared to groups of children who had suffered persistent or acute diarrhoea[171]. A study in Guinea-Bissau showed results that were suggestive of an increased risk of diarrhoea in infants starting breastfeeding after 6 hours from birth, with odds ratios tending to increase as the delay in initiation increased[172]. 95% confidence intervals for all presented odds ratios did however overlap with 1.00, possibly as a result of an insufficient sample size (n=279). Delayed initiation of breastfeeding has also recently been implicated in increased risk of neonatal hypothermia in southern Nepal[173].

Breastfeeding promotion and breastfeeding initiation time outcomes. There have been a number of studies including a breastfeeding promotion component that demonstrated improvement in time to initiation of breastfeeding, with different strategies utilised in community-[164,174-176], and hospital-based[150,154,177], settings. At the community level, training of health workers and breastfeeding counselling for women have been shown to generate substantial improvements in rates of colostrum feeding, early initiation of breastfeeding, and continuing exclusive breastfeeding[175,178], and participatory women's groups organised in rural India have been associated with earlier initiation of breastfeeding[176]. A recent community package of essential newborn care interventions, including breastfeeding promotion, in Uttar Pradesh, northern India, was found to increase the probability of initiation of breastfeeding within one hour of birth by over four times in both intervention groups (essential newborn care and essential newborn care plus a hypothermia detection

indicator) compared to control clusters[164]. Whereas the rate of breastfeeding within the first hour was 16% in control clusters, the rate was over 67% in both groups of intervention clusters after 16 months of the trial. Individuals were targeted at the household level to include pregnant women or mothers, and mothers-in-law (who are often the key decision-makers on newborn care practices, as in Nepal), while health system workers, TBAs and community stakeholders such as village heads were also targeted. Parallels can be drawn with a cluster-randomised controlled trial conducted by our own group and partners in Makwanpur, Nepal, whereby mothers in intervention clusters receiving a community action cycle of women's groups were at a suggestive but non-significant increased probability of initiating breastfeeding within the first hour after birth[174], amongst a range of other measured outcomes. The results from Uttar Pradesh suggest that, with effects observable in a trial area with a total population of over 100,000, early infant feeding practices and other aspects of newborn care can be greatly improved through rural community-based strategies at a large scale in developing settings. Hospital-based policies and strategies including encouragement of early mother-infant contact[177], rooming in (infants staying in the same room as their mother after delivery)[150], and health education on breastfeeding[154], have improved the time to breastfeeding initiation in a number of developing country clinical settings. A mass media campaign on television and radio in Jordan significantly improved the proportion of mothers initiating breastfeeding within six hours, and reporting knowledge of colostrum, in home and public hospital settings[179]. Table 1.7 suggests that delay of initiation of breastfeeding beyond the first hour may be more common in south Asia than in sub-Saharan Africa, but delay beyond the first day is comparably frequent in both regions.

Table 1.7: Percentage of newborn infants who started breastfeeding within one hour and within one day – DHS data from selected developing countries [a]. Results describe preceding 0-4 years.

Location	DHS Year	% Breastfeeding within 1h of birth	% Breastfeeding within 1d of birth
Sub-Saharan Africa			
Dem. Rep. of the Congo[16]	2007	48.1	82.6
Ghana[17]	2008	52.3	82.4
Namibia[19]	2006/7	71.3	92.1
Nigeria[20]	2008	38.4	67.5
Sierra Leone[21]	2008	50.5	85.7
Uganda[22]	2006	42.2	86.1
Zambia[23]	2007	56.5	93.1
Zimbabwe[24]	2005/6	69.2	93.4
South Asia			
Bangladesh[25]	2007	42.6	89.1
India[26]	2005/6	24.5	55.3
Nepal[7]	**2006**	**35.4**	**85.0**
Pakistan[27]	2006/7	28.8	69.5

[a] DHS surveys obtained from www.measuredhs.com

Birthing environment and breastfeeding initiation time. Local attitudes and norms, availability of infant feeding information and support, and a mother's motivation and ability to act on choices are all factors likely to influence breastfeeding behaviours[180], including the time to initiation of breastfeeding. However, events surrounding the birth process and maternal health conditions also define the likelihood of early initiation by affecting the onset of lactation. Stresses at birth, including Caesarean section (scheduled and unscheduled), prolonged stage two of labour (from full dilation to delivery), and delivery assisted by vacuum extraction, have been associated with delayed initiation of breastfeeding[181-183]. More general stress during labour as measured by prenatal cortisol levels is also associated with delayed onset of lactation, and multiparous women have an earlier onset time of lactation than primiparous women[184]. A survey of breastfeeding

practices in Guatemala City observed that children born at home or in Ministry of Health health centres were four times as likely to initiate breastfeeding within the first hour, compared to infants born in private hospitals, after adjusting for a number of confounding factors[185]. A delay in the onset of lactation has also been reported in cases of poorly managed type I diabetes[186]. Delayed initiation of breastfeeding may subsequently be associated with a shorter total nursing period[187], shorter duration of full breastfeeding[188], and less optimal established breastfeeding. Associations have also been drawn between different practices of early infant feeding – in an investigation of prelacteal infant feeding practices in rural Egypt, breastfeeding initiation occurred significantly earlier ($p<0.001$) among newborn infants who were not given prelacteal feeds[149].

Some of the associations described are prone to difficulty in assigning causality – for example, do mothers giving birth at home in Guatemala initiate earlier because they are under less perinatal stress, or because mothers who choose to give birth at home are also in turn more likely to choose to initiate early? However, they suggest that the birthing environment can affect breastfeeding initiation time and potentially other dimensions of early infant feeding.

Existing evidence on exclusive and predominant breastfeeding, and early initiation of breastfeeding, largely points to a protective effect on neonatal mortality and morbidity outcomes. Associations between prelacteal feeding and neonatal mortality have been inconsistent, with no study conducted in a south Asian context. Several interventions have resulted in improved early infant feeding practices in community and hospital environments of developing countries.

The findings of this review highlight a need for further analysis into the relationship between prelacteal feeding and neonatal mortality, particularly in a south Asian context. Results presented by Edmond et al.[160], and Mullany et al.[138], describe a protective effect of early initiation of breastfeeding on neonatal mortality and invite replication.

1.4 DISCARDING THE FIRST MILK: ANOTHER DIMENSION OF EARLY INFANT FEEDING?

A positive dose-response relationship of early initiation of breastfeeding with neonatal survival has been observed. However, there may be a further aspect of perinatal breastfeeding that can be identified and formalised, that is linked with, but conceptually distinct from, time to initiation of breastfeeding: active discarding of the first breastmilk before initiation of breastfeeding (i.e. discarding some colostrum but not necessarily all). In this section I begin with an overview of beliefs and practices that may accompany first milk discarding across different cultures, highlighting perceptions of colostrum and the discarding of colostrum as a potentially widespread issue in early infant feeding. Several studies have treated breastfeeding initiation time, prelacteal feeding, and discarding of first milk as separate entities. One behaviour does not necessarily equate with the other, even if they are associated and all represent behaviours that can take place in the first days postpartum. A mother who discards some of her first breastmilk and who has negative perceptions of colostrum may still initiate breastfeeding early and her infant may still receive much of the beneficial content of colostrum. I argue here that discarding of first breastmilk is a valid further dimension of research in early infant feeding and a widespread issue that demands investigation.

1.4.1 Beliefs and practices regarding colostrum

Globally, there exist a range of beliefs about colostrum, including positive, neutral or negative perceptions. Delayed initiation of breastfeeding, active discarding of first milk, prelacteal feeding and delayed contact between mother and infant are amongst the potential results of negative perceptions. Several ethnographic studies illustrate these points, and a number of examples are discussed below.

Interviews with elderly women in Guinea-Bissau on the use of colostrum and ideas about bad milk revealed that Islamic groups in the region tended to give positive value to colostrum and initiate breastfeeding within the first day, whereas the most populous ethnic group of the study region (the *Balanta*) tended to regard colostrum as 'dirty' and as representing a risk of disease and death to the newborn infant[189]. In this group, prelacteal feeding was given in place of any breastfeeding for the first week after birth. The majority of women from other ethnic groups assigned neutral status to early breastmilk. In a review of the anthropological literature on infant feeding practices immediately after birth conducted in 1990, 16 of 120 distinct cultural groups identified worldwide were generalised as reporting that colostrum was "dirty, poisonous, contaminated, bad or contained pus", with several further groups classified as believing colostrum causes vomiting and diarrhoea, or that it is stale[190]. The authors made a qualitative association of these reports with delayed initiation of breastfeeding and administration of prelacteal substitutes. A further example comes from Nigeria[178], where focus group discussions with senior women across several communities revealed that new mothers were instructed to bath, to wash their nipples to remove dirt, and to express and discard colostrum before breastfeeding could start. A potentially associated belief was that if a mother breastfeeds before cleaning her nipples, the newborn infant is at increased risk of diarrhoea. Some individual respondents described colostrum as "pus", containing germs, or "dirty". Additionally, most women (typically 80%) across several regions of Indonesia have been described as providing their breastmilk only after customarily discharging their colostrum, with mothers-in-law and traditional birth attendants typically advocating the practice[191]. Widespread discarding of colostrum has also been described in Cambodia[192].

Comparison can be made with negative beliefs about colostrum documented as follows in a *Maithili* population of the *Terai* region of Nepal[193]:

> *"Women were unanimous in their avowal that the initial milk rich in colostrum, is not and should not be fed to the infant. Some women claimed that just as the blood of birth (khas) is foul by virtue of its having stagnated in the womb for 10 months, so also is colostrum milk which has 'gone off'. We were told that a baby who drinks colostrum would vomit. Other women, however, flatly rejected the notion that colostrum could at all be milk. For them colostrum is a foul substance that oozes from the breasts; it is only by describing it as pus that one can evoke the kind of repugnance which some mothers felt toward the prospect of feeding it to their babies."*
>
> *Source: Reissland,N. and Burghart,R. 'The quality of a mother's milk and the health of her child: Beliefs and practices of the women of Mithila.' Soc. Sci. Med. 1988; 27(5):461-9*

Transcript data presented from an interview in rural West Bengal, as part of a recent study examining the socioeconomic and cultural factors influencing maternal and child health care practices in the region[194], similarly suggest that perceptions of colostrum by mothers may lead to delayed initiation of breastfeeding as well some colostrum discarding, described as distinct behaviours:

> *"I put my son to breast after two days, as the milk 'comes' only after 48 hours. Before I put him to breast I squeezed the yellowish liquid and threw it, as it is harmful for his health because he would not be able to digest this thick yellow liquid."*
>
> *Source: Bandyopadhyay, M. 'Impact of ritual pollution on lactation and breastfeeding practices in rural West Bengal, India.' International Breastfeeding. 2009; 4(1):2*

A comparison has been made of prelacteal feeding practices in Muslim and Hindu populations who had recently migrated to the USA, which included consideration of beliefs on colostrum[195]. The authors made the generalisation that Muslim families give prelacteal feeds in the first days following birth because colostrum may be considered as dirty or harmful, amongst other reasons, despite the approval of breastmilk in the Qur'an. In comparison, the authors assert that some Hindus hold the belief that colostrum is too thick for a newborn infant to swallow, or that the first breastmilk is "stale", with the result that the breast must be washed and colostrum discarded on the first day. Further examples of negative perceptions of colostrum, and their impact on early infant feeding, can be identified; communities have been described in Papua New Guinea that do not allow a newborn infant to receive breastmilk determined to be "hot" (yellow)[196].

Perspective must however be retained, as expression of colostrum is by no means universally observed whenever the issue has been investigated, and beliefs about it are not always reported to be negative. This has been the case in Burma[197], some Indian rural communities[198], and some populations of Guinea-Bissau as described above[189]. A number of ethnographic examples have been cited from Africa in a single volume, describing several populations where attitudes toward the benefits of colostrum have been mixed amongst mothers[199].

1.4.2 First milk or colostrum discarding in existing data

Previous investigators have to some extent equated delayed initiation of breastfeeding with discarding of colostrum[170], or equated prelacteal feeding with discarding of colostrum[195]. While these behaviours are linked with each other, and delayed initiation is expected to reduce the amount of colostrum received by an infant, there is also reason to treat breastfeeding initiation time and active discarding of milk before the infant is first put to the breast as distinct dimensions of early infant feeding. Several surveys[200,201], published articles[151,202,203], and reports[204], have already described delayed initiation of breastfeeding and discarding of first milk or

colostrum as distinct behaviours, particularly in south Asia. However, no robust study of first milk discarding on neonatal mortality or morbidity outcomes exists to date, and the volume of colostrum discarded is rarely described.

Previous investigation of colostrum feeding and neonatal mortality and morbidity. To the author's knowledge, one study has investigated an association between feeding of colostrum and neonatal and post-neonatal mortality. Data presented on urban and rural residents of Varanasi district in Uttar Pradesh, India, suggested a higher rate of neonatal and post-neonatal deaths amongst infants of women who reported no knowledge or use of colostrum[205]. Calculations derived from this study's overall results table suggest that neonatal mortality was 19.4 deaths per thousand live births amongst the group of mothers who were categorised as having knowledge and use of colostrum, compared to 68.8 amongst the mothers with no knowledge and use of colostrum, which produces a crude relative risk of neonatal mortality of 3.5. Usage of colostrum was less frequent in rural areas. However, the study was lacking in many respects; there was no clear explanation of what was meant by 'knowledge and use of colostrum' (a binary measure), information was not provided on how mortality data were collected, no consideration of confounding factors was made, and no attempt was made to limit reverse causality. The study also suffered from a relatively small sample size (n=707), no statistical analysis was made to determine if 'knowledge and use of colostrum' was significantly associated with neonatal or post-neonatal deaths, and some figures displayed in the paper's results tables do not reliably tally with reported totals. No assessment of potential association with cause-specific mortality or morbidity outcomes was made. The results were, however, highly suggestive and do invite further investigation.

A descriptive study of early breastfeeding practices, including colostrum feeding, and neonatal morbidity outcomes has been performed in selected areas of eight Latin American countries and Portugal, all in socioeconomically deprived suburban areas[206]. 500 families were typically included in each study area, with some countries (Brazil, Argentina, Mexico) contributing more than one study area. 7569 infants were included in total, of which 86% were reported to take colostrum, and 25% initiated breastfeeding within six hours of birth. Neonatal morbidity, defined in part as incidence of hospitalisation, diarrhoea or dehydration, was found to be

significantly more likely in infants who did not take colostrum ($p<0.05$), although no association was found with breastfeeding initiation time. Despite the wide geographical coverage and the relatively large sample size, the study did, however, suffer from a number of shortcomings or issues limiting external validity. The investigator's definition of neonatal morbidity was ambiguous and incidence of hospitalisation may be a poor measure of morbidity in areas far from a facility, no consideration of reverse causality was made, and although data were collected via a questionnaire with nearly 300 questions, no provision was made to control for potentially confounding variables other than socioeconomic indicators which were roughly constant throughout the total sample. The meaning behind 'taking of colostrum' by an infant was not further clarified by the author. Procedures for randomly allocating study participants within study areas were questionable (choosing families on one side of a road only and living at odd-numbered houses) although unlikely to significantly affect the outcome. The study also may have only limited external validity to rural developing country settings. Despite all of the above caveats, the study was again suggestive and demands further investigation of the topic.

Previous instances where breastfeeding initiation time and expression of colostrum were measured as separate dimensions. Six descriptive studies of early infant feeding practices in India have presented breastfeeding initiation time and rejection of colostrum as separate measurable entities[151,202,203,207-209], and further examples come from Pakistan[210], Nigeria[178,211], and Latin America with Portugal[206]. These are summarised as follows.

A survey of 1050 mothers in Karnataka state reported that only 0.3% of respondents initiated breastfeeding within one hour of birth, and 6.2% within four hours of birth, whereas non-rejection of colostrum was reported in 71.4% of cases (28.6% rejected colostrum)[202]. Similarly, 95% of mothers fed their newborn infants colostrum while only 59% initiated breastfeeding within six hours in a study in Navi Mumbai[203]. A lower proportion – 82% - fed their infants colostrum in a survey in Chandigarh, Punjab[207]. Colostrum discarding has also been reported in a clinical setting in Bihar state,[151], separately from prelacteal feeding and breastfeeding initiation time, where 83% of mothers discarded colostrum and only 0.6% of mothers initiated breastfeeding within six hours of birth. A hospital-based descriptive study in New

Delhi of 702 mothers with an urban background found that 95% initiated breastfeeding before their time of hospital discharge following delivery, while 86% did not give colostrum[208]. In an apparently large survey across 18 Indian states that has been subject to surprisingly little dissemination, 40% of mothers surveyed reported that they discarded colostrum, accompanied by the widespread belief that colostrum was harmful to the newborn infant's health[209]. In four of the areas surveyed, nearly one third of mothers were advised by nursing staff to discard colostrum[209]. This study unfortunately did not report on its sample size, sampling criteria or how data were collected, and so the ability to make wider inferences is limited.

Comparison can be drawn with one study from Pakistan and two from Nigeria. In a study based in an urban public sector hospital in Hyderabad, Pakistan, 71% of mothers were reported to have discarded colostrum while only 37% of infants initiated breastfeeding after the first day[210]. These results from Pakistan must however be interpreted with caution because the sample was of 100 mother-infant pairs in which the infant had been admitted to the paediatric ward of the study hospital due to a problem, and it is not clear how long after birth the participant mothers may have filled the questionnaire. Data on attitudes and practices in early breastfeeding collected from women in their third trimester of pregnancy in Nigeria suggested that 39% of respondents reported that they would not feed their infants colostrum, while only 25% would initiate breastfeeding one day after delivery or later[178]. In this example the distinction must be made between anticipated practices amongst pregnant women and actual practices after delivery. In a separate investigation, questionnaires collected from 310 mothers across five rural communities in Nigeria found that 54% reported that they discarded colostrum, while only 29% of infants were breastfed within 24 hours of birth[211]. The results of these two Nigerian studies are consonant with each other. All of the above examples made a distinction between breastfeeding initiation time and discarding of colostrum, and assessed the frequency of each. The study involving eight Latin American countries and Portugal, cited earlier, also measured colostrum feeding and breastfeeding initiation time separately[206].

Although these studies reported some degree of colostrum discarding, it is not clear whether mothers totally discarded all breastmilk over an initial period of time, or if

they discarded only a fraction. It is also not clear if discarding occurred before the first instance of breastfeeding only, or if it continued for several days after delivery. Some Indian studies have reported no withholding of colostrum[212,213]. Definitions or thresholds adopted by investigators to classify instances of colostrum discarding may vary[213]. Practices may also vary significantly by social and caste strata which pervade Hindu culture.

One qualitative study in Madhya Pradesh, India, has gone some way to addressing these issues[214]. 50 mother-infant pairs were observed in a hospital from delivery until discharge and subsequently interviewed in a community context on practices related to colostrum feeding. From the hospital observation it was found that a proportion of mothers (a number is not given) discarded several drops of breastmilk before initiating feeding, and that mothers who initiated breastfeeding after one or two days did not necessarily discard any colostrum. The subsequent community-based interviews revealed that in two distinct communities (42% of the sample) colostrum was not discarded at all and interviewer questioning on the issue provoked surprise. 38% of respondents across several communities initiated breastfeeding after two days but did not discard colostrum. However, 20% of mothers, all in the same community, were reported to find colostrum harmful. They discarded colostrum during the first two days after delivery, manually expressing a quantity of milk several times a day, potentially before each feed. The amount discarded ranged from a few drops to a few spoonfuls.

Demographic and Health Surveys including data on colostrum feeding. The Demographic and Health Surveys of Pakistan in 2006-07[200], and Ethiopia in 2005[201], provide notable instances where breastfeeding initiation time and reported discarding of some colostrum have been recorded and displayed as separate measures in early infant feeding. Discarding of colostrum is not a statistic reported in DHS surveys for any other countries. The Pakistan 2006-07 DHS labels a data heading “percentage who were given colostrum”, reporting an overall figure of 62.8% among last-born children ever breastfed in the five years preceding the survey[200]. The original survey question used to collect this specific data was worded “did you give (NAME) the thick milk (colostrum) that comes first or did you discard it?” The Ethiopia 2005 DHS labels a data heading “percentage who received the first milk”, reporting an overall frequency of 45.3%[201]. The original survey question

was worded “did you squeeze and throw away the first milk?” For comparison, the percentage who received a prelacteal feed was 65.2% in Pakistan and 29.0% in Ethiopia, and the percentage who started breastfeeding within one day of birth was 69.5% in Pakistan and 85.7% in Ethiopia. These figures are summarised in Table 1.8.

Table 1.8: Percentage of newborn infants who started breastfeeding within one day, percentage who received a prelacteal feed, and percentage who were fed colostrum, among last-born children ever breastfed – DHS data from Pakistan and Ethiopia [a]. Results describe preceding 0-4 years.

Country	DHS Year	% Breastfeeding within 1 day of birth [b]	% Who received a prelacteal feed [c]	% Who were given colostrum [d]
Pakistan[200]	2006-07	69.5	65.2	62.8
Ethiopia[201]	2005	85.7	29.0	45.3

[a] DHS surveys obtained from www.measuredhs.com

[b] Includes infants who started breastfeeding within 1 hour of birth

[c] Defined in DHS as “received something other than breastmilk during the first three days of life, before the mother started breastfeeding regularly”

[d] Ethiopia DHS equivalent heading is labelled “percentage who received first milk”

It has been possible to obtain access to the datasets for the Pakistan DHS survey 2006-07 and Ethiopia DHS survey 2005 (www.measuredhs.com) with the permission of Measure DHS. The datasets contain information on prelacteal feeding, breastfeeding initiation time, and feeding of colostrum or first milk amongst other variables. They allow several questions to be asked that are relevant to the discussion at hand:

- Is prelacteal feeding significantly associated with feeding colostrum in Pakistan and Ethiopia DHS data?
- Is early initiation of breastfeeding (within 24 hours of birth) significantly associated with feeding colostrum in Pakistan and Ethiopia DHS data?
- Even if they are statistically associated, does prelacteal feeding or late initiation (after 24 hours) always imply that colostrum is not fed?

Cross-tabulation of prelacteal feeding or breastfeeding initiation within 24 hours with colostrum feeding allows elucidation of the above questions, as shown in Tables 1.9-1.12.

Table 1.9: Crosstabulation of prelacteal feeding and squeezing and throwing of first milk, with χ^2 analysis [a], Ethiopia DHS 2005

		Squeeze out and throw away first milk [b]		
		No	Yes	Total
No prelacteal	Count	2292	2148	4440
	% within Squeeze out and throw away first milk	72.9%	66.3%	69.6%
Prelacteal feeding	Count	852	1091	1943
	% within Squeeze out and throw away first milk	27.1%	33.7%	30.4%
Total	Count	3144	3239	6383

χ^2 = 32.35, d.f. = 1, p < 0.001

[a] Continuity correction applied

[b] Wording as used by Ethiopia DHS 2005

Table 1.10: Crosstabulation of prelacteal feeding and giving colostrum, with χ^2 analysis [a], Pakistan DHS 2006-07

		Gave colostrum to child [b]		
		Yes	No	Total
No prelacteal	Count	1459	438	1897
	% within Gave colostrum to child	41.4%	25.9%	36.4%
Prelacteal feeding	Count	2065	1252	3317
	% within Gave colostrum to child	58.6%	74.1%	63.6%
Total	Count	3524	1690	5214

χ^2 = 117.66, d.f. = 1, p < 0.001

[a] Continuity correction applied

[b] Wording as used by Pakistan DHS 2006-07

Table 1.11: Crosstabulation of early breastfeeding initiation (within 24 hours) and squeezing and throwing of first milk, with χ^2 analysis [a], Ethiopia DHS 2005

		Squeeze out and throw away first milk [b]		
		No	Yes	Total
Initiation ≥ 24 h	Count	357	571	928
	% within Squeeze out and throw away first milk	11.4%	17.6%	14.5%
Initiation < 24 h	Count	2787	2668	5455
	% within Squeeze out and throw away first milk	88.6%	82.4%	85.5%
Total	Count	3144	3239	6383

χ^2 = 50.04, d.f. = 1, p < 0.001

[a] Continuity correction applied

[b] Wording as used by Ethiopia DHS 2005

Table 1.12: Crosstabulation of early breastfeeding initiation (within 24 hours) and giving colostrum, with χ^2 analysis [a], Pakistan DHS 2006-07

		Gave colostrum to child [b]		
		Yes	No	Total
Initiation ≥ 24 h	Count	666	740	1406
	% within Gave colostrum to child	18.9%	43.8%	27.0%
Initiation < 24 h	Count	2859	951	3810
	% within Gave colostrum to child	81.1%	56.2%	73.0%
Total	Count	3525	1691	5216

χ^2 = 357.65, d.f. = 1, p < 0.001

[a] Continuity correction applied

[b] Wording as used by Pakistan DHS 2006-07

Tables 1.9 and 1.10 compare prelacteal feeding and 'squeezing and throwing of first milk' or 'giving of colostrum' in DHS data for Ethiopia and Pakistan. For both surveys, prelacteal feeding and discarding first milk demonstrate a strong association ($p < 0.001$ for both Ethiopia and Pakistan). Given that a mother provides her infant with a prelacteal feed, in Ethiopia she is over a third more likely to also 'squeeze and throw' her first milk (RR = 1.37), and in Pakistan she is twice as likely to not give colostrum (RR = 2.02), compared to mothers not offering any prelacteal feed.

It can also be seen that, in Table 1.9, 3000 respondents, or 47.0% of the total for which data were available, displayed a combination of responses either of prelacteal feeding with no squeezing of first milk, or no prelacteal feeding but with some discarding of first milk. In Table 1.10, a total of 2503 respondents (48.0%) displayed the equivalent combinations. These figures illustrate the point that no logical equivalence can be made between reported prelacteal feeding and 'squeezing and throwing' of first milk, even if the behaviours are associated. The treatment of prelacteal feeding and discarding of first milk as distinct but associated dimensions appears to be valid.

Tables 1.11 and 1.12 compare early initiation (within 24 hours) and 'squeezing and throwing of first milk' or 'giving of colostrum' in DHS data for Ethiopia and Pakistan. Again, for both surveys strong associations are observed ($p < 0.001$ for both Ethiopia and Pakistan). Given that a mother reported that she initiated breastfeeding on or after 24 hours postpartum, she was two-thirds more likely to also squeeze and throw her first milk in Ethiopia (RR = 1.67) and over three times as likely to not give colostrum in Pakistan (RR = 3.34), compared to mothers reporting that they initiated breastfeeding within 24 hours. Relative risks are provided for illustrative purposes and do not imply a causative relationship in addition to association.

In Table 1.11 there were 3025 respondents, or 47.4% of the total, who either gave colostrum while also delaying initiation, or reported that they did not give colostrum but initiated within 24 hours. In Table 1.12, 1617 respondents, or 31.0% of the total for whom data were available, gave an equivalent combination of possible replies, including 951 respondents who reported that they initiated breastfeeding within 24 hours but did not give colostrum to their infant. Since colostrum is commonly

defined to include breastmilk within the first two days postpartum, it is logically impossible for a mother to give no colostrum while also initiating breastfeeding within the first day, so a valid interpretation of such a combination of responses may be that mothers who report that they do not feed colostrum are discarding some of their first milk while also feeding some in the first day. The precise wording of the translation of the question offered to mothers, indicated in Appendix F of the Pakistan DHS 2006-07[215], is "did you give (NAME) thick milk (colostrum) that comes first or did you discard it?" Potential responses included "give" or "discard", so such an interpretation appears to be valid. In common with prelacteal feeding, the figures indicated in Tables 1.11 and 1.12 suggest that no logical equivalence exists between reported late breastfeeding initiation and squeezing and throwing of first milk, even if the behaviours are associated. The treatment of breastfeeding initiation time and discarding of first milk as distinct but associated dimensions appears to be legitimate.

What remains to be seen, however, is whether discarding of first milk displays an effect on neonatal mortality that is distinct from and in addition to any impact attributable to prelacteal feeding or delayed initiation of breastfeeding.

First milk in Nepal. In Nepal, a qualitative investigation into the role of Tamang grandmothers in perinatal care revealed a clear distinction in perceptions between *khil* – described as dirt or stale milk that closes the nipple – and *bigouti* milk, described as yellow and roughly translating as colostrum[216]. It was reported that washing away *khil* before the first feed was a widespread practice as an action promoting the flow of breastmilk. A further source from Nepal has made generalised statements about a tendency for mothers in both the hills and the *Terai* to discard colostrum, usually with initiation of breastfeeding on the third day after delivery[217]. However, this report was not supported by any data.

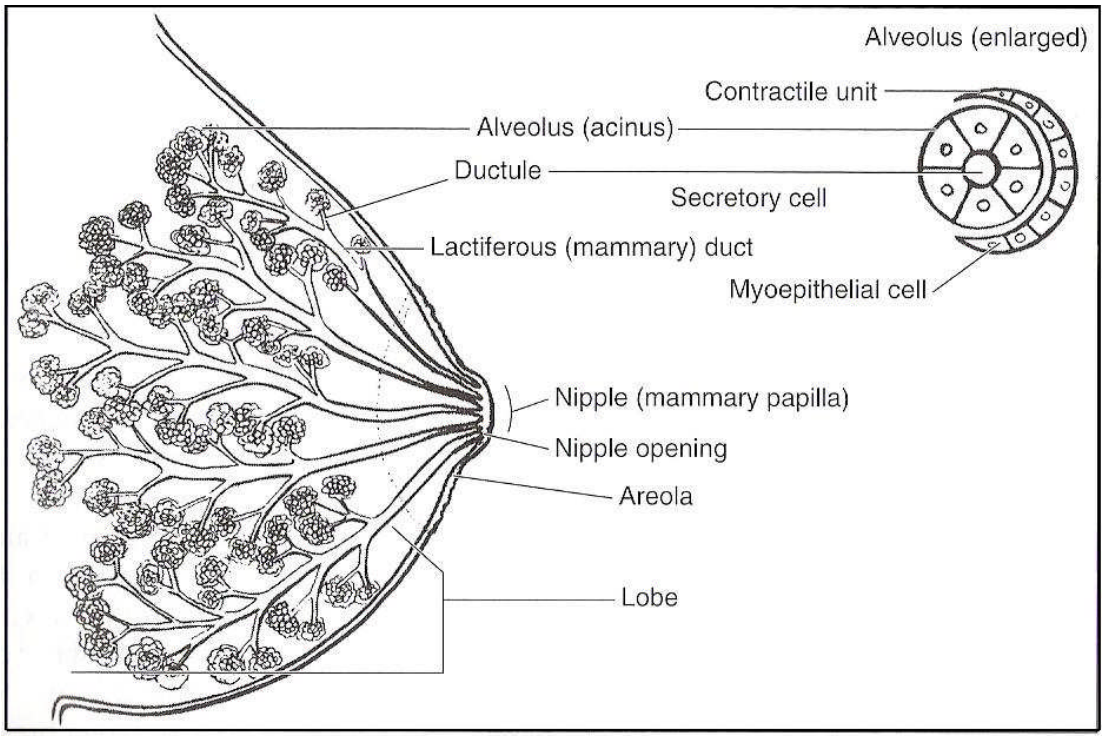
1.5 COLOSTRUM AND EARLY BREASTMILK

Negative perceptions of colostrum have been described in multiple contexts globally, and the discarding of first milk or some amount of colostrum – distinct from prelacteal feeding and late initiation of breastfeeding – is one of the potential results of such beliefs. Why is this relevant to neonatal survival? Why should we raise the hypothesis that discarding of first milk might be associated with neonatal mortality, cause-specific mortality and morbidity outcomes? In this section I give an overview of the physiology of lactogenesis and the composition of early breastmilk, and introduce potential causal pathways of colostrum's benefit on neonatal survival. I then make reference to existing animal studies, typically derived from veterinary research, indicating the significant impact of not receiving colostrum on newborn infant survival in several farm animals, with discussion of the relevance of these results to human neonatal survival. This section raises the expectation, based on an understanding of biological mechanisms, that discarding of some colostrum will increase the risk of neonatal mortality, highlighting the need for further investigation.

1.5.1 Breast structure

Although breast development occurs during an individual's own gestational period, childhood and puberty, complete development of mammary function occurs only in pregnancy[218]. With reference to Figure 1.5, alveoli form the basis of mature glandular tissue, with each cluster of alveoli surrounded by contractile myoepithelial cells, which cause ejection of milk into the ductules and in turn into larger ducts which lead to duct openings or nipple pores[218]. The milk-producing cells in the alveoli are known as acini cells. Alveoli are clustered into lobes, which are surrounded by fibrous connective tissue (Cooper's ligaments) and fatty tissue. There are approximately 5-25 lobes in each breast depending on which source is consulted[218,219]. The breast has a large blood supply primarily via the internal mammary and lateral thoracic arteries, branching into capillaries which provide for synthesis of breastmilk, and the nerve supply of the breast is derived from the second to the sixth intercostal nerves[106,218]. Lymphatic drainage of the breast is extensive. Although it has previously been believed that milk is stored within an area of the areola known as the lactiferous sinuses, re-investigation of the anatomy of the lactating breast using ultrasound has suggested that sinuses are absent and ducts are involved only in the transportation of milk[219]. This has implications for the understanding of infant attachment to the breast as it has previously been considered that a significant proportion of the areola must be included in suckling so that milk can be drawn from the lactiferous sinuses[220].

Figure 1.5: Schematic diagram of breast structure



Source: Riordan,J. and Wambach,K. *Breastfeeding and Human Lactation. 4th Edition.* 2010. London, Jones and Bartlett Publishers: pp81

1.5.2 Lactogenesis

Lactogenesis describes the transition in mammary secretion from pregnancy to lactation, with the onset of copious milk secretion[221]. It occurs in two stages, with the first stage preparing the mammary glands for milk secretion and the second stage producing greater volumes of milk. Lactogenesis stage I occurs from mid-pregnancy to approximately day two or three postpartum. Lactogenesis stage II occurs from day two or three to approximately day eight[106,218].

During the second half of pregnancy, secretory activity accelerates and the alveoli expand with colostrum. Stage I of lactogenesis is characterised by initiation of milk synthesis, differentiation of epithelial cells of the alveoli to secretory cells, and

stimulation of milk production in mammary secretory epithelial cells by elevated prolactin levels[106,218]. Lactogenesis does not initially depend on suckling by the infant until at least the third day postpartum[222]. After that time, secretion declines if milk is not removed from the breast; failure of early removal of colostrum from the breast is associated with high milk sodium, which produces a poor prognosis for later breastfeeding success[166].

Stage II in the postpartum period is initiated by a fall in plasma progesterone after delivery of the placenta while prolactin levels remain high and cortisol levels remain somewhat elevated[106,166], with increased volumes of milk secretion as a result. Release of oxytocin from the posterior pituitary is also necessary for milk production during this phase[218]. Elevated prolactin and oxytocin levels are required for continuing milk production, and suckling provides stimulation for prolactin and oxytocin release[106]. Interestingly, in a study that included women who elected not to breastfeed and where suckling did not occur, their breast secretion in many respects returned to a fluid that was similar in composition to colostrum[223].

The inhibiting influence of progesterone on progression of lactogenesis has led to observation of delayed lactation in instances where placental fragments are retained after birth[224]. High breastmilk sodium levels have been implicated in impaired stage II lactogenesis[225], but there are difficulties in assigning cause-and-effect since women electing not to breastfeed have also been observed to experience increased breastmilk sodium levels[223].

1.5.3 Dynamic breastmilk composition after birth

Colostrum may be described as the breastmilk produced in the first two or three days postpartum, although milk composition is continually changing throughout this time and there is a degree of heterogeneity between individuals. Breastmilk from day three to approximately day eight or nine is often referred to as transitional milk, coinciding with stage II of lactogenesis. Two measures must be kept in mind when

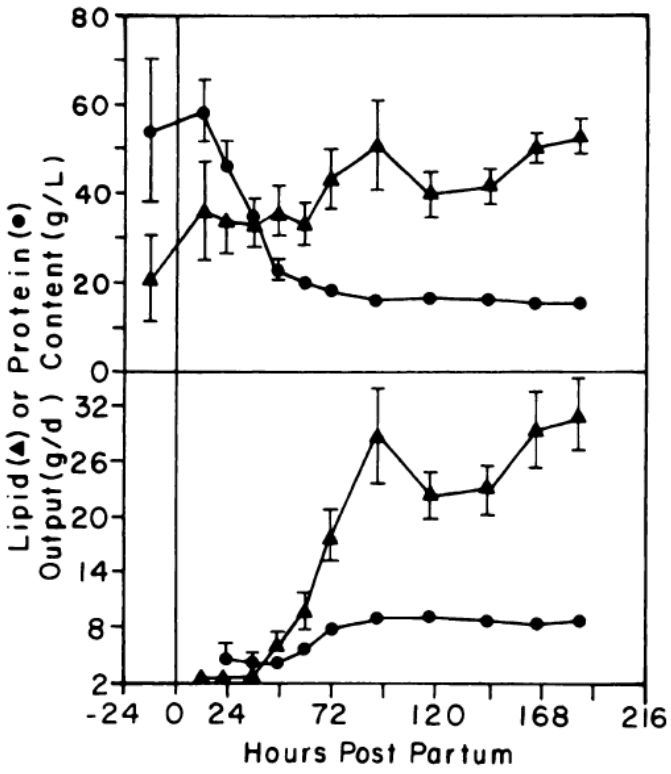
considering the dynamic composition of breastmilk postpartum: (i) total output of each breastmilk constituent, and (ii) relative concentration. Although these measures are related, total milk volume increases significantly from two days postpartum, meaning that the secretion rate of a given constituent must correspondingly increase for concentrations to remain constant.

This point is illustrated by Neville and colleagues' description of concentrations and secretion rates of lipids and protein (Figure 1.6), and citrate, glucose, free phosphate, magnesium, lactose, potassium, sodium, chloride and calcium (Figure 1.7), during the first eight days postpartum[222]. Total milk volume increases from no more than 100-120ml per day at 36 hours postpartum[221,222], levelling off at approximately 600ml per day after four days postpartum; a fivefold increase. Mean total milk volume is less in the first day postpartum, averaging approximately 60ml for the first 24 hours, but measurements during this time exhibit a proportionally wider degree of variability between individual women[221]. Changes in the concentration of breastmilk constituents must be considered in reference to this overall increase in milk volume. Lipid concentrations steadily increase from birth until day eight as secretion rates greatly increase, suggesting that the role of colostrum in providing energy may be less critical than for later breastmilk. Protein concentrations fall during this time despite a modest increase in secretion rate (Figure 1.6). The protein content of colostrum includes multiple components involved in immunological defence, while some easily digested milk proteins such as β-casein are absent or in very low concentrations[221].

Concentrations of citrate, glucose, free phosphate, lactose, potassium and calcium all increase during the changes in breastmilk composition from colostrum to transitional milk, with citrate concentrations in particular paralleling activity of the mammary glands[221]. Concentrations of magnesium remain roughly constant, and concentrations of sodium and chloride fall despite small increases in secretion rate (Figure 1.7)[222]. Mean pH decreases slightly from 7.6 to 7.1 over the first eight days, copper concentrations remain approximately constant, and zinc concentrations decrease by over a half from means of 775 to 330 μg/100ml[226]. Copper is a constituent of several metalloenzymes and symptoms of its deficiency in infants include unresponsiveness to iron supplementation and anaemia[221]. Significantly elevated concentrations of β-endorphins are also observed in colostrum compared

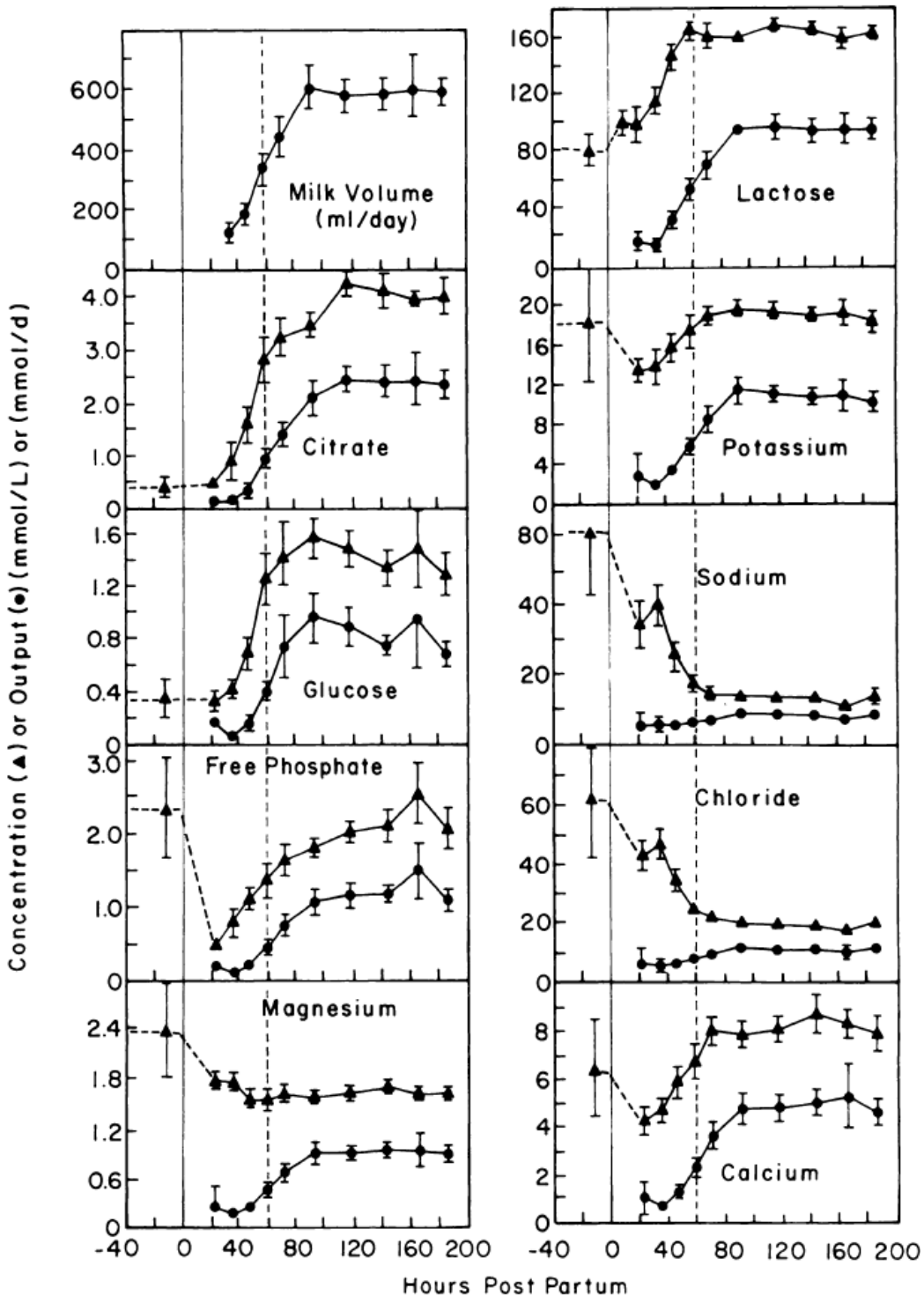
to transitional milk at ten days postpartum and mature milk one month postpartum[227]. Water constitutes a mean of 87.5% of milk volume and provides adequate hydration to the infant without the need for other liquids[218]. Figures 1.6 and 1.7 illustrate the constantly changing and distinct content of breastmilk in the first three days after birth, suggesting particular suitability of colostrum to the needs of the newborn infant during this time.

Figure 1.6: Mean lipid (▲) and protein (●) concentrations (top) and secretion rates (bottom) ± standard deviation during lactogenesis in 13 women. Average of both breasts



Source: Neville, M.C., Allen, J.C., Archer, P.C. et al.: *Studies in human lactation: Milk volume and nutrient composition during weaning and lactogenesis.* Am J Clin Nutr 54:81-92, 1991.

Figure 1.7: Mean concentrations (▲) and secretion rates (●) ± S.D. of multiple milk components during lactogenesis in 13 women



Source: Neville, M.C., Allen, J.C., Archer, P.C. et al.: *Studies in human lactation: Milk volume and nutrient composition during weaning and lactogenesis.* Am J Clin Nutr 54:81-92, 1991.

1.5.4 The value of early breastmilk constituents

The lipid fraction of breastmilk not only provides a major energy component in early and established breastmilk, it also delivers a wide range of long-chain polyunsaturated fatty acids, especially omega-3 and omega-6 essential fatty acids associated with brain development[218]. Lactose accounts for most of the carbohydrate content of breastmilk, and it metabolises to glucose and galactose and enhances calcium absorption[218].

The protein composition of early breastmilk is itself dynamic, and includes casein, enzymes, epidermal growth factors and non-casein whey protein which is composed in turn of several major components including lactoferrin, immunoglobulins and lysozyme[228,229], all of which are involved in immunological defence. Lactoferrin is a protein of particular interest, as it may additionally reduce inflammatory responses, help protect the infant against iron deficiency[228], and has been shown to directly stimulate early postnatal intestinal development[230], with potential implications for risk of intestinal infection. At high concentrations, lactoferrin acts as an optimal intestinal growth factor, but at low concentrations it inhibits cell growth[230]. A growth promotion effect of lactoferrin on several strains of *Bifidobacterium* has also been demonstrated[231]. As such, lactoferrin may represent a crucial component of colostrum, potentially influencing neonatal survival through a number of mechanisms.

Human colostrum is rich in vitamin E (tocopherols) serving an anti-inflammatory and antioxidative function alongside vitamins A and C[218]. It is uncertain whether vitamin K concentrations are greater in colostrum than in mature milk, and the amount of vitamin K in human milk is low enough to present difficulties in its detection[221]. Zinc supplementation has been shown to significantly reduce the length and severity of diarrhoeal episodes and potentially respiratory tract infections in infants and young children in studies across several developing countries[232], suggesting that the higher concentration of zinc in colostrum may confer a similar immunological benefit. The elevated concentrations of β-endorphins that are observed in colostrum have been hypothesised to help the newborn infant overcome the stressful events of labour and delivery[233], but the addictive properties of such opiates may also act

as a stimulant for the infant as one of several mechanisms affecting the likelihood of future breastfeeding success.

Human milk, and in particular colostrum, contains a number of major components serving an immunological function, supporting the immunological immaturity of the newborn infant. These include phagocytes, lymphocytes, oligosaccharides, glycoconjugates, lactoferrin, lysozyme, immunoglobulins SIgA, IgG and IgM, cytokines, and free fatty acids[218]. IgA is the primary immunoglobulin of colostrum and established human milk. It has been found to form antibodies against a wide range of antigens including *E. coli*, Salmonella and Shigella[234], and the SIgA antibodies in an individual mother's milk reflect her respiratory and gastrointestinal antigens, giving the newborn infant protection against the pathogens prevalent in his or her environment[235]. A further function of IgA is to bind to bacterial toxins and to prevent adhesion of microbial pathogens onto the epithelial surfaces of the gut[234], an essential first step in pathogenesis. IgG and IgM are produced in smaller quantities, but the presence of IgG in colostrum may be particularly important because the ability to produce several IgG sub-classes is delayed in the newborn infant[234]. Immunological defences in the newborn infant are not yet fully mature, so the immune transfer from colostrum and later milk is particularly valuable; infant stomach acid is weaker and allows survival of more ingested pathogens, fewer phagocytes are produced, and B-lymphocytes express immunoglobulins in lesser quantities.

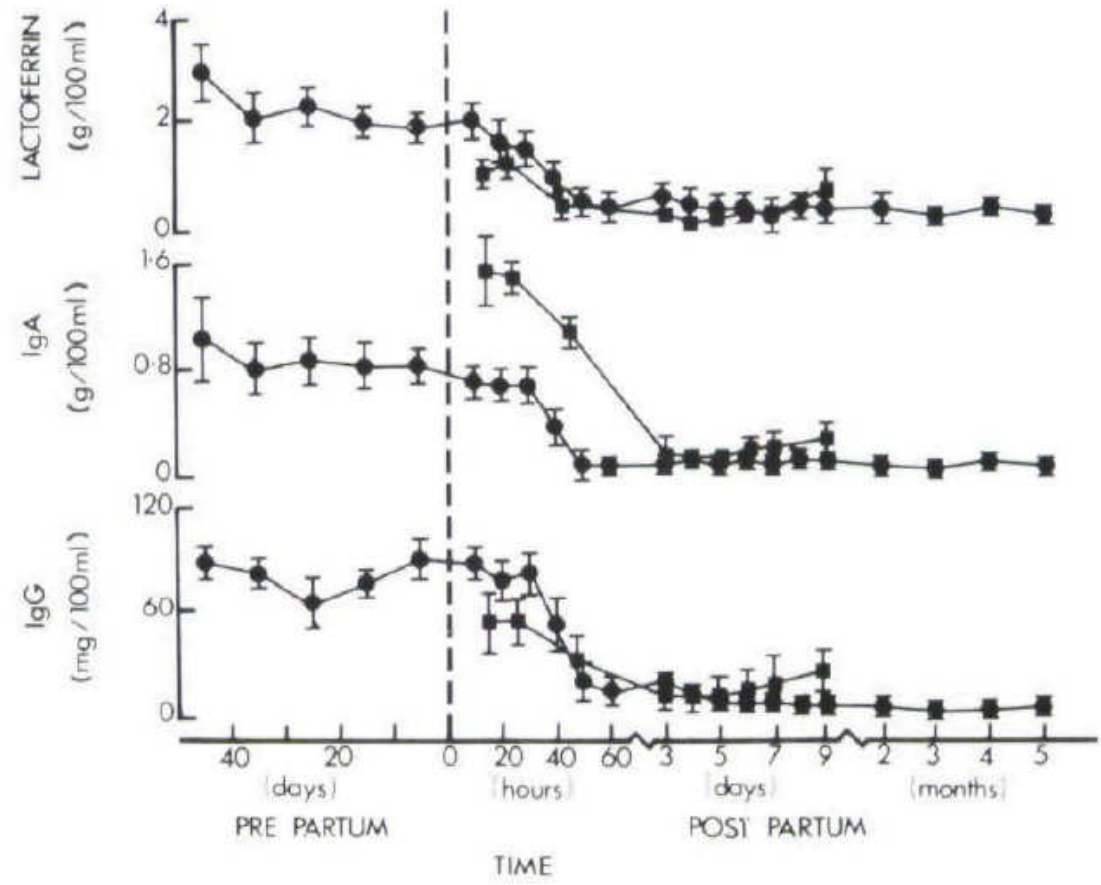
Simple descriptions of the immunological function of further components in colostrum and established breastmilk are as follows. Phagocytes play a role in both innate and adaptive immunity including through phagocytosis of bacteria and fungi, oligosaccharides and glycoconjugates display non-specific antimicrobial and antiviral activity and oligosaccharides metabolise to simpler sugars that promote probiotic bacterial growth, cytokines promote infant immune development, lymphocytes are involved in immunity and specific antiviral response and include memory T cells which provide longer-term protection as part of the adaptive immune response, and lysozyme exhibits bactericidal properties through hydrolysis of specific bonds in the cell walls of bacteria[221,229]. Specific pro-inflammatory cytokines have been argued to provide a protective role against neonatal necrotizing enterocolitis, caused by intestinal colonization by pathogenic bacteria[236].

Lactoferrin's strong affinity for iron produces antibacterial activity particularly against *E. coli*, and has two major effects on gastrointestinal pathogens through inhibiting growth and decreasing ability for attachment[237]. Lactoferrin has been further implicated in antiviral activity, through its binding to host cells and viral particles[238].

Colostrum has been shown to contain elevated levels of lactoferrin, IgA and IgG (Figure 1.8)[223]. Although not fully apparent from Figure 1.8, Kulski and colleagues describe a 16-, 13- and six-fold decrease in concentrations of lactoferrin, IgA and IgG respectively from 20 hours to 96 hours postpartum amongst breastfeeding women[223]. The authors do not state the mean value of measurements taken at 20 and 96 hours.

Although immunoglobulin concentrations are greatest in colostrum, the question has been raised amongst some breastfeeding experts of whether total amounts of immunoglobulin received by the newborn infant are greater in the first few days after birth or later on[239], as volumes of breastmilk increase with the onset of lactogenesis. With reference to Figure 1.7, it was shown that milk volume per unit time from the first day to the fourth day increases approximately fivefold. However, concentrations of IgA and IgG both reduce by a factor of greater than five and so it may be hypothesised that colostrum contains somewhat greater absolute amounts of IgA and IgG, as well as higher concentrations, compared with milk produced after three or four days. This property would further highlight the immunological significance of the composition of breastmilk produced in the very first days after birth.

Figure 1.8: Mean changes ± standard error in the concentrations of lactoferrin, IgA and IgG in the mammary secretion of four breastfeeding women (●) and four non-breastfeeding women (■) during late pregnancy and early lactation. Average of both breasts



Source: Kulski, J.K. and Hartmann, P.E.: *Changes in human milk composition during the initiation of lactation.* Aus J Exp Bio Med Sci 59(1):101-114, 1981

1.5.5 Newborn infant gut flora and immune development

Human milk casein and the simple sugars derived from lactose have been hypothesized to stimulate the growth of *Lactobacillus* probiotic bacteria strains[240], in addition to serving the nutritional needs of the breastfeeding infant. The adherence of *Lactobacillus acidophilus* varieties in the human gut has been found to competitively inhibit establishment of *Escherichia coli* and *Salmonella typhimurium*[241], representing one of several hypothesised pathways through which breastmilk is protective against diarrhoea. Of particular note, exposure to *L. acidophilus* before or together with exposure to *E. coli* was found to be more effective than *L. acidophilus* incubation after exposure to *E. coli*[241]. This finding suggests that delayed initiation of breastfeeding and discarding of colostrum could diminish the probiotic advantage of early breastmilk conveyed to the newborn infant. Such a causal pathway can be treated as distinct but complementary to the fact that exclusive breastfeeding, and no prelacteal feeding, prevents exposure to potentially contaminated foods or water[242]. Components of colostrum may also stimulate the development of the infant's own immune system, and alter the physiological state of the gastrointestinal tract from its condition during fetal life to a condition adapted for extrauterine life, in part by decreasing the permeability of the intestinal tract[243]. Early breastmilk is a source of maternal bacteria for the infant's gastrointestinal tract, including Streptococci and Staphylococci, which may stimulate immune development[218].

It can be hypothesised that the initial exposure of the newborn infant to its first feed, in terms of quantity of colostrum received, timing of initiation, and presence of any prelacteal feeds, may all influence the early establishment of the newborn infant's gut flora, both in terms of the competitive inhibition of establishment of pathogenic microorganisms and the maturation of the gastrointestinal tract. An association of colostrum discarding behaviour specifically with neonatal diarrhoeal morbidity and mortality may therefore be reasonably expected.

1.5.6 The composition of first breastmilk of mothers of premature infants, and justification for excluding premature infants from the scope of the thesis

The composition of early breastmilk collected from mothers of premature (typically defined as 31 to 36 weeks gestation) infants differs from early breastmilk produced for infants born at term. In preterm early breastmilk, concentrations of long-chain polyunsaturated fatty acids and easily-absorbed medium-chain fatty acids are elevated, while oleic acid (omega-9) is reduced[244]. Increased concentrations of sodium, chloride, magnesium, iron and nitrogen have also been reported for preterm early milk[245]. The increased levels of readily absorbed fatty acids and other differences in preterm milk may meet the particular needs of premature infants, and there is evidence that the energy density of preterm mother's milk is significantly greater due to higher fat concentration[246]. Due to the different breastmilk composition and specific mortality risks that premature infants experience compared to infants born at term[247], the scope of this thesis is limited to early feeding of infants born at term only.

1.5.7 Early mother-infant contact

Although not a property of colostrum per se, the environment in which the mother and infant interact following birth may be viewed in a more holistic sense, and the feeding or discarding of some colostrum may in turn be associated with maternal behaviours influencing neonatal survival as well as maternal health.

A small Swedish study produced results suggesting that infant suckling within 30 minutes was associated with increased maternal attention (measured by time spent with the infant and time spent talking to the infant) in the first four days after birth in

a hospital nursery setting, while mother-infant skin-to-skin contact was held constant[248], although this study suffers from limitations in deducing cause-and-effect – decreased maternal attention may lead to delayed suckling or vice versa. Newborn infants display a 'rooting reflex' to find the breast shortly after birth and open their mouth upon stimulation, and have been observed to use their hands to explore and stimulate their mother's breast in preparation for the first feed. Periods of massage-like hand movements or suckling by the infant immediately following birth were reported to be followed by an increase in maternal oxytocin levels[249]. Early suckling has been shown in further studies to increase postpartum uterine activity[111]. Because oxytocin plays an important role in uterine contraction, milk ejection, and mother-infant bonding, the discarding of first milk may be hypothesised to interfere with early mother-infant interaction and possibly even to increase the incidence of maternal bleeding. Effective early suckling and maternal-infant bonding may in turn influence subsequent breastfeeding quality in the following weeks and months.

Since discarding of colostrum has already been described as arising in some contexts through washing of the breast or wiping of the nipple, or otherwise delaying or interrupting mother-infant contact, the behaviours that potentially accompany colostrum discarding may in turn interfere with early skin-to-skin contact. Skin-to-skin contact has been shown to influence skin temperatures in infants in the postnatal period[250], and to influence neuroendocrine mechanisms in maternal-infant attachment[251]. In the case of immediate mother-infant skin-to-skin contact after birth via the vaginal route, skin and faecal contact as well as first breastfeeding colonise the newborn infant with microorganisms against which the mother can transfer specific immunity through her breastmilk. In contrast, interrupting very first mother-infant contact – which may be intrinsic to behaviours involved in discarding of first milk – may cause the initial microbial colonisation of the newborn infant to come from external sources. In hospital environments, microbial sources other than from the mother may be anticipated to be particularly harmful. Early skin-to-skin contact is also implicated in reducing the risk of neonatal hypothermia[252,253].

1.5.8 Studies on colostrum in farm animals

Veterinary studies have examined the impact of colostrum on the newborn survival, morbidity and development of several farm animals, and the subject has economic significance to the farming industry. All females of the vertebrate class Mammalia have mammary glands[107], and placental mammals include cattle, horses, pigs, sheep and humans. A strong impact of impaired colostrum feeding and its associated transfer of antibodies and immunoglobulins on newborn survival and disease susceptibility in other placental mammals leads to the suggestion that similar negative consequences may be anticipated in humans.

Colostrum feeding has been described as a key factor in determining newborn calf health and survival[254]. In a small study comparing calves that received fresh colostrum (n=12) or colostrum supplement (n=12), the relative risk of mortality in the calves fed colostrum supplement was 1.90, and IgG concentrations were significantly lower[255]. In a longitudinal observational study in smallholder dairy farms in Ethiopia, 185 calves were monitored from birth to six months, and age at first colostrum ingestion was described as a significant predictor of morbidity indicators[256]. The relative risk of morbidity in calves that ingested their first colostrum after six hours was over twofold (RR 2.24, $p<0.001$). Calves dying within three weeks of birth have been found to exhibit significantly lower serum IgG concentrations than clinically normal calves, and low IgG concentrations are attributable to failure in passive transfer of colostral immunoglobulin[257]. In a study from California, neonatal mortality was 20% in dairy herds under investigation, but immunoglobulin deficiencies were observed in almost 90% of all calves which died within the first week[258], implying poor uptake of colostrum in the majority of cases of neonatal death. In addition to affecting immune status and mortality, delayed colostrum intake after 24 hours also has wide-ranging effects on metabolic and gastrointestinal traits[259], and on lipid, α-tocopherol, carotene and retinol status[260], in neonatal calves.

Similar evidence exists for horses. In a comparison of eight foals deprived of colostrum with six foals allowed to suckle normally, seven of the deprived foals demonstrated clinical signs of sepsis, of which four died[261]. Post-mortem lesions

indicated that all four deaths were infection-related. None of the normally-fed foals died, suggesting in this example that colostrum deprivation had a dramatic impact on the likelihood of newborn foal survival. In a prospective study of risk factors for neonatal foal mortality, 334 foals were monitored over a six week period[262]. An overall mortality rate of 22% was observed, and major risk factors associated with foal death included a difficult labour, low birth weight, lack of rainfall and low temperature, with failure of passive transfer of antibodies via colostrum found to be a particularly significant predictor ($p<0.0001$). An impact of failure of colostrum feeding on survival of lambs[263,264], and piglets[265], has also been reported.

There is, however, a caveat to the extent to which the impact of reduced colostrum feeding on human neonatal survival can be inferred from the results of veterinary studies. In a number of ways, the structure of the placenta in humans is different from that of the other mammals discussed here[266]. Placental structural differences affect the extent of immunological transfer that takes place in-utero, and subsequently affect the importance of immunological transfer postpartum via colostrum. In common with rodents, primates exhibit a single discoid-shaped placenta. In contrast, horses and pigs have diffuse placentas, while ruminants (including cows and sheep) have multiple discrete areas of attachment, called a cotyledonary placenta[266]. Placentas are also categorised by the number of tissue layers separating maternal and fetal blood, with variation typically occurring in the number of maternal tissue layers. Humans have fewer layers of tissue separating maternal and fetal blood. The placentas of horses, pigs, cattle and sheep are known as epitheliochorial, containing six layers of tissue, compared to the hemochorial placentas of humans which contain only three[266].

Consequently, humans have been shown to acquire a greater extent of their passive immunity during prenatal life. Although there is not necessarily a direct relationship between placental thickness and efficiency of maternal-fetal transport, IgG is transported across the human placenta but not across the placentas of the other mammals discussed here, so the IgG content of colostrum in these animals is of more critical significance to their newborns. In colostrum collected from 36 mares within six hours of labour, mean concentrations of IgA, IgG and IgM were 122.9 mg/dL, 8,912 mg/dL and 957 mg/dL, respectively[267]. This can be contrasted with the measurements for human colostrum immediately pre- and postpartum (Figure 1.8),

indicating a mean concentration of IgA of approximately 800mg/dL, and a mean concentration of IgG of approximately 85mg/dL in the period encompassing parturition[223]. IgG concentrations are far greater in mare colostrum than in human colostrum, corroborating the suggestion that human newborn infants rely less on colostrum for the transfer of IgG.

Despite these physiological differences between species, the impact of interruptions in colostral feeding in farm animals invites speculation on the possible effects in humans.

1.6 CAUSAL PATHWAYS THROUGH WHICH DISCARDING OF COLOSTRUM MAY AFFECT NEONATAL SURVIVAL

A number of potential causal pathways have been described above, through which the discarding of some colostrum may affect neonatal mortality. The existence of several posited pathways adds biological plausibility to potential observed relationships between colostrum discarding and neonatal mortality. These are summarised as follows, and outlined in Figure 1.9:

- *Impaired mother-to-infant immune transfer with subsequent increase in incidence and severity of infection, leading to increased risk of death caused by infection*. This pathway is suggested by the elevated concentrations of lactoferrin, immunoglobulins and other immunologically active agents in colostrum, and the large impact on newborn survival of unsuccessful colostrum feeding in farm animals.

- *Reduced probiotic gut colonisation, and reduced infant colonisation by other maternally-sourced microorganisms, in turn reducing competitive inhibition of establishment of pathogenic bacteria, and influencing immune development and gut permeability, leading to increased risk of infectious causes of death.* The effect may be particularly strong in cases of hospital birth, where initial colonisation by pathogens not of maternal origin would be different from those microorganisms normally endemic to the mother's environment, against which a degree of immunity was transferred in-utero. Amongst hospital births, caesarean section deliveries may be particularly high risk because the newborn infants are not exposed to the mother's perennial microbes in the same way as infants delivered vaginally.

- *Reduced intake of growth factors, lactoferrin and other agents involved in intestinal cell proliferation, leading to less established gut development and permeability, influencing infection risk.*

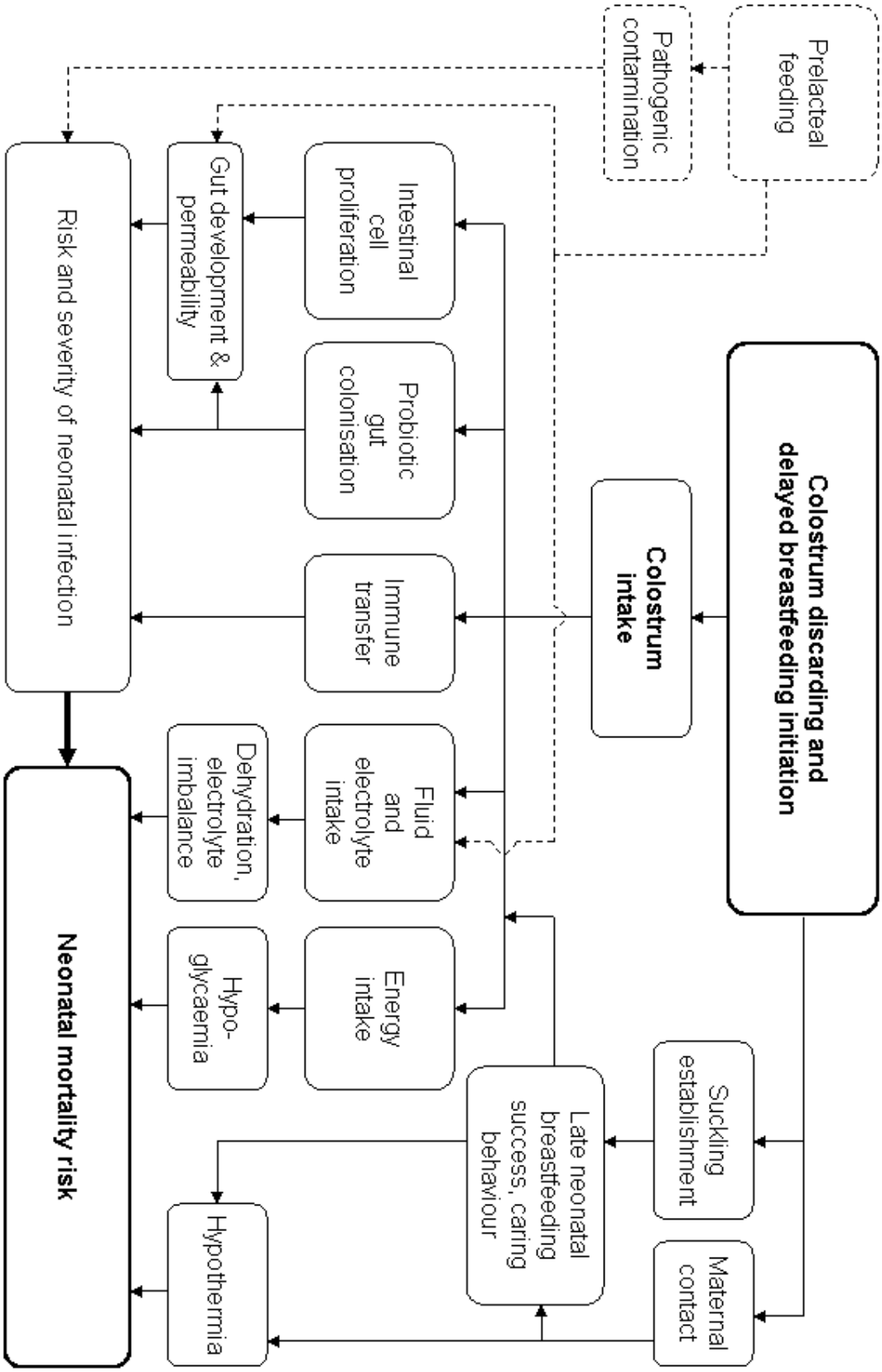
- *Impaired early suckling behaviour influencing later breastfeeding success, potentially increasing risk of late neonatal mortality.* One newly hypothesised mechanism in this pathway is that the elevated levels of endorphins in colostrum may aid in encouraging later breastfeeding.

- *Reduced fluid, electrolyte and energy intake immediately postpartum, influencing metabolic function and risk of dehydration and electrolyte imbalance, and hypoglycaemia.* Since the total volume and energy content of colostrum is low in the first 24 hours, any milk discarded may represent a significant fraction to the newborn infant, and delayed initiation may lead to hypoglycaemia[154]. The concentrations of sodium, magnesium and chloride, and to a lesser extent potassium, are high in colostrum, suggesting that its electrolyte content is adaptive to postpartum survival.

- *Reduced maternal contact potentially associated with discarding of colostrum, increasing risk of hypothermia.* Events and behaviours necessary for discarding of colostrum may also impair early maternal bonding via a neuroendocrine oxytocic pathway, influencing later maternal caring behaviour.

The above pathways, outlined in Figure 1.9, are distinct from further mechanisms through which prelacteal feeding might affect neonatal survival. Early consumption of liquids or solids other than breastmilk may affect fluid and electrolyte intake, gut development and permeability, and contamination by microorganisms, influencing risk and severity of neonatal infection. Causes of death not displayed in Figure 1.9 include asphyxia, congenital abnormalities, birth trauma and prematurity. This indicates that, by the framework described in Figure 1.9, such causes of neonatal death are not pathways anticipated to be influenced by colostral intake or behaviours associated with discarding of colostrum. However, events leading to these causes of death are likely to impede successful suckling, introducing a methodological challenge in inferring a temporal sequence of cause and effect, discussed in Chapter 2.

Figure 1.9: Causal pathways through which discarding of colostrum may affect neonatal survival, with consideration of breastfeeding initiation time and prelacteal feeding



1.7 STUDY RATIONALE

Strategies to reduce global neonatal mortality in developing countries are crucial, because of the growing importance of newborn survival to overall child survival. The vast majority of neonatal deaths occur at home, and south Asia accounts for large absolute numbers of these deaths. Neonatal mortality rates can be substantially reduced by simple, sustainable, equitable and cost-effective strategies that are scalable. A number of low-cost community interventions are already known and reflected in policy, including promotion of exclusive breastfeeding to six months of age.

A large and growing body of evidence exists demonstrating an impact of multiple dimensions of early infant feeding on infant mortality, and protective effects of early breastfeeding initiation and exclusive or predominant breastfeeding on neonatal mortality and morbidity are reasonably well established. The dynamics of breastfeeding in the first days after delivery are, however, not fully understood.

Ethnographic reports of colostrum discarding exist internationally, and several quantitative data sources include information on it. Yet no robust study has quantified the impact, if any, of discarding of first milk on neonatal mortality, independently of the impact of breastfeeding initiation time. The range of precise behaviours and quantities of discarded first milk that constitute maternally reported discarding of colostrum remains unclear.

The impact of impaired colostral transfer in newborn farm animals is substantial, and a number of plausible biological pathways exist through which colostrum discarding may be anticipated to impact upon human neonatal mortality. Hypotheses may be raised of a relationship between colostrum discarding and all-cause neonatal mortality, cause-specific neonatal mortality, and neonatal morbidity attributable to infection. The equation of delayed breastfeeding initiation with colostrum rejection by some previous investigators may be challenged; discarding of colostrum may be an associated but distinct dimension of early infant feeding in

addition to breastfeeding initiation time and prelacteal feeding, representing a needed item in future surveys and data collected on early infant feeding.

Evidence relating prelacteal feeding with neonatal mortality is inconclusive to date, and no study exists from south Asia. There is also scope to add to the growing weight of epidemiological evidence relating breastfeeding initiation time and neonatal mortality.

Two large cluster randomised trials have been conducted in Nepal by the Mother and Infant Research Activities (MIRA) NGO, investigating the impact of a participatory community intervention with women's groups on neonatal health outcomes, and more recently a community-based sepsis management intervention involving Female Community Health Volunteers. The two sites are Makwanpur district, located south west of Kathmandu, and Dhanusha district, located in the *Terai* region. MIRA has been collecting data from 2001 in Makwanpur and 2006 in Dhanusha, with the primary aim of evaluating the efficacy of the trials' interventions in each area. Study participants comprised all married women aged 15 to 49 years in the study clusters, with monthly visits by a network of community-based incentivised fieldworkers to detect pregnancies. Questionnaires were taken more than 4 weeks after birth, in which birth outcome was recorded in addition to several other characteristics of the mother, newborn, and household, including socioeconomic data and information on maternal care, newborn care and breastfeeding, and maternal location during pregnancy. Verbal autopsies were also taken for cases of neonatal death, allowing estimation of cause of death.

The data collected from the two large surveillance systems furnished an opportunity to test hypotheses regarding colostrum discarding and neonatal mortality, morbidity measures, and cause-specific mortality, in addition to other dimensions of early infant feeding. MIRA's familiarity within Makwanpur district also afforded the possibility for qualitative investigation through interviews and focus group discussions to elucidate in further depth the dynamics and underlying reasons of first breastfeeding and colostrum discarding amongst mothers in the region.

Since discarding of colostrum may be a widespread practice in Nepal and globally in developing countries, clarifying its nature and its impact has relevance for improving neonatal care practices and neonatal survival in an equitable way at the community level. The findings of this study may influence future policy, promotion efforts, and data collection and hypothesis generation by further investigators.

1.8 AIMS AND OBJECTIVES

The overall aim of the thesis was to explore early infant feeding practices and neonatal mortality across two trial surveillance systems in rural sites in Nepal, with a particular interest in the discarding of first breastmilk as a new dimension in research on early infant feeding.

1.8.1 Primary objectives

The primary objectives were to examine the associations between maternally reported discarding of first breastmilk and neonatal mortality in (i) Makwanpur and (ii) Dhanusha districts, and (iii) to describe qualitatively the nature of practices and reasons behind keeping or discarding first breastmilk in Makwanpur.

1.8.2 Secondary objectives

Secondary objectives were to (i) describe any association between discarding of first milk and suspected acute respiratory infection based on verbal autopsy data, (ii) analyse risk of infection-specific neonatal mortality by first milk discarding status, (iii) determine characteristics predicting the discarding of first milk as a risk-factor analysis, (iv) replicate previous analyses of established breastfeeding patterns (exclusive and non-exclusive breastfeeding) and breastfeeding initiation time and neonatal mortality, (v) clarify any relationship between prelacteal feeding and neonatal mortality, and (vi) qualitatively explore the range of behaviours represented by mothers categorised as having discarded or not discarded their first milk in the surveillance systems of the studies.

1.9 STRUCTURE OF THE THESIS

Chapter 1 has provided the necessary grounding in neonatal mortality trends, relevant epidemiological literature to date, and the biological background of hypothesised mechanisms, to justify the rationale and introduce the study aims and objectives. Chapter 2 explores the analytical issues to be considered in observational studies of this type, including identification of potential confounding covariates, limitation of reverse causality, and implications of analysis of clustered data. Chapter 3 describes the setting of the Makwanpur and Dhanusha studies, with details of design and data collection. It also describes the statistical methods used to analyse the quantitative data generated from Makwanpur and Dhanusha. Chapter 4 describes the qualitative methods used in the investigation of behaviours and reasons for discarding or feeding first milk amongst mothers in Makwanpur.

The next three chapters present results. Chapter 5 displays results of quantitative investigation of data from Makwanpur, with discussion. Chapter 6 displays results of quantitative investigation of data from Dhanusha, accompanied by discussion. Chapters 5 and 6 are structured around exploration of primary objectives (i) and (ii), and secondary objectives (i) to (v) listed above, in that both present results on first milk discarding and all-cause neonatal mortality, cause-specific mortality and suspected acute respiratory infection from the respective study sites, while also considering the influence of non-exclusive breastfeeding, other dimensions of early infant feeding, and quantitative predictors of first milk discarding. Chapter 7 presents the results and analysis of the qualitative investigation within Makwanpur.

Chapter 8 is a discussion of the evidence generated throughout the thesis to critically examine whether discarding of first breastmilk constitutes a valid dimension of research in early infant feeding, whether a causal link may be inferred between the discarding of colostrum and neonatal mortality independently of other dimensions of early infant feeding, what the nature of discarding practices may be, and whether the study has internal and external validity. Chapter 8 concludes with recommendations for further research and potential implications for international policy and breastfeeding promotion programmes.

1.10 CANDIDATE'S INVOLVEMENT IN THE STUDY

The candidate was responsible for all analyses presented in the thesis, including conception of hypotheses. All presented qualitative work, including original conception, study design and preparation, data collection and analysis was conducted by the candidate, with the assistance of an employed Nepali research assistant in the development of interview tools and conduction of interviews and focus group discussions in Nepali language, and transcription in English. The candidate was also responsible for a limited extent of quantitative data entry from the Dhanusha study site, and extensive feedback and correction of data within the data management systems of both Makwanpur and Dhanusha.

The candidate was not involved in original design or management of the Makwanpur and Dhanusha trial surveillance systems. Neither was the candidate involved in the classification of causes of death based on verbal autopsy data.

CHAPTER 2: QUANTITATIVE METHODOLOGICAL CHALLENGES

It is commonly perceived that there is a hierarchy of evidence in epidemiology, with experimental methods often preferred over observational methods, largely due to their potential to minimise bias and confounding[268]. There are, however, instances where observational methods are more practical or ethical[269].

As I elaborate further in Chapters 3 and 4, the quantitative data sources which this study draws upon are from surveillance systems primarily designed for the evaluation of two cluster-randomised controlled trials, with community-based interventions randomly allocated to some areas but not others in each research site. However, the exposures of interest for the PhD investigation – discarding of first milk, prelacteal feeding, breastfeeding initiation time and established breastfeeding pattern – are not randomly allocated at the level of the cluster, or at the level of each mother and infant. As I describe further in Chapters 3 and 4, the descriptive data produced resembles a cohort study for the purposes of the investigation, in common with the majority of studies examining breastfeeding and neonatal or infant outcomes (see Appendix A). This raises a number of issues in the analytical methodology associated with observational studies, and particularly associated with the investigation of breastfeeding and infant and child outcomes, which decrease the ability to infer a causal relationship based on association. These include difficulties with bias, confounding and reverse causality. The clustered nature of the data sources produces further issues. I discuss such considerations in this chapter, and steps that can be considered in assessing causality, before providing details of the study sites, study design, data collection and analysis methods used in Chapters 3 and 4.

2.1 COHORT STUDY DESIGN

Observational methods comprise cross-sectional surveys, case control and cohort studies[270,271]. As is clarified in Chapters 3 and 4, the descriptive data produced from the two cluster-randomised controlled trials that the investigation is largely based upon resemble that produced by cohort studies for the purposes of the thesis.

Cohort studies involve the monitoring of a group for a period of time as cases of an outcome of interest manifest. Comparison is made on the basis of the exposure variables under investigation; in this study the discarding of first breastmilk, prelacteal feeding, breastfeeding initiation time and exclusive breastfeeding. Cohort studies are usually confined to investigations of aetiological factors[271], and confer a number of advantages relevant to this investigation, including the ability to investigate multiple outcomes, and the ability to calculate incidence rates[272].

Existing trial frameworks were used in the examination of early infant feeding practices and neonatal outcomes in the thesis. However, a cohort study would remain the preferred method if specifically designing data collection to study early infant feeding practices and neonatal mortality. Although experimental study designs have a number of widely acknowledged advantages, not all hypotheses can be investigated with experimental methods and instead require observational methods. There are several commonly cited arguments for why this is the case[269], of which the following are particularly relevant to this study:

(i) Random assignment of an exposure of interest is unethical in instances where the exposure is believed to be harmful, including discarding of colostrum.

(ii) Some exposures will not be acceptable to all participants if randomly allocated, or it will be impossible for all to comply. This applies if a mother believes that colostrum is harmful.

(iii) Observational studies have the potential to test multiple hypotheses or variables in one study, whereas testing of more than two interventions in

a randomised controlled trial produces prohibitively complex trial designs with multiple combinations of potential allocations.

Generic difficulties of cohort studies, which also apply to trials of the scale described in Chapters 3 and 4, are predominantly practical and financial ones; a large sample size is required for the study of a rare outcome, there is the potential for high loss of participants to follow-up, typically many participants are recruited which makes the study more expensive, and collecting rich baseline data from large numbers of participants is either time-consuming or requires a sophisticated data collection system[272].

2.2 ANALYTICAL DIFFICULTIES OF COHORT STUDY DESIGN

Several issues in observational research limit the validity of produced results. Investigation of infant feeding practices and mortality and morbidity outcomes requires consideration of information bias, selection bias, confounding and the potential for reverse causality. This section considers the aspects of these analytical difficulties particularly relevant to the investigation.

2.2.1 Bias

Studies examining the health effects of breastfeeding suffer from several sources of bias, including information bias and selection bias[93]. Random error in any source of bias leads to an underestimation of a true association, while systematic error can increase or decrease the extent of an estimated association[93]. Several classification systems exist with regard to bias[273], although they are often grouped into three general categories[274]: information bias, selection bias and confounding. Aspects of information bias and selection bias most relevant to the thesis are considered in this sub-section. Confounding is then explored.

Information bias describes a random or systematic error, in this context in the measurement of an infant feeding dimension, or in the measurement of an outcome[93]. This is most likely to be an issue where information on exposure to breastfeeding practices is collected via questionnaire with the mother and not through direct observation. While little bias of this nature is expected from a binary outcome as clearly defined as neonatal mortality, misclassification may still be possible if early neonatal deaths are reported as stillbirths or vice versa[275]. There is greater scope for information bias in the reporting of morbidity outcomes or breastfeeding practices. Such misreporting may be due to error in recall, misinterpreted questionnaire items, questionnaire items serving as a poor proxy for

ascertaining actual exposure status, or provision of responses perceived by the respondent to be socially desirable[274].

Investigation has been made into the potential extent of recall error in infant feeding practices. In Peru, differences have been identified between 12-hour maternal recall of infant feeding practices and 12-hour direct observation of them, with maternal age and education associated with differences between observed and reported practices[276]. The Peruvian study did, however, highlight that differences between the methods may represent actual differences in practices over the time periods when observation or recall occurred. This is a particular difficulty for the measurement of exclusive, predominant and partial breastfeeding because asking questions on feeding in a set preceding time period does not capture information on whether the mother has exclusively breastfed since birth[128]. Short recall periods are most suitable when a feeding practice is stable, but 24-hour recall is likely to produce 'false positives' in the recording of exclusive breastfeeding, which has the potential to be dynamic[277]. This is not a problem faced in the measurement of early infant feeding practices immediately postpartum, because for these exposures only one distinct time period is under investigation.

Detection bias, where infection is more readily detected in one group than another, is an example of information bias that has been reported as a frequent problem in literature relating breastfeeding and infant infection[278,279]. Since the stools of non-breastfed infants are looser and less frequent than those of breastfed infants, it has been argued that diarrhoeal cases may be more easily detected in non-breastfed infants[278,279]. Careful attention must be paid to the method of measurement of diarrhoeal incidence if a hypothesis of altered diarrhoeal morbidity is being tested for any aspect of infant feeding.

A further source of information bias may originate if a negative outcome in the infant in turn affects the likelihood of recording a breastfeeding practice perceived to be negative. This can occur when either the mother or interviewer hold perceptions of some responses being more positive than others; a mother may unintentionally be more likely to recall perceived problems if her infant died, or an interviewer may intentionally or unintentionally be more likely to record breastfeeding practices expected to be negative.

In a questionnaire, the wording of a question and the potential range of closed responses can also affect the identification of exposure groups. Closed questions may limit the extent to which respondents can provide an answer that accurately reflects previous events or actions, while open questions allow a full range of responses but prevent the homogeneity in coding necessary for statistical analysis[280]. There is a risk that respondents do not understand a question or are forced in one direction or the other, although this may be mitigated by the option to provide 'don't know' responses.

Selection bias occurs if some members of a population are more likely to participate in a study than others[274]. A major potential source of such bias for cohort studies is differential loss to follow-up amongst different exposure groups, or differential loss to follow-up due to an outcome, including neonatal mortality[274]. There is also potential for individuals in some geographical areas to be less easily located or contacted, particularly in surveillance of remote or mountainous terrain. Such individuals may be more likely to belong to one exposure group than another. It is therefore necessary to select a random sample from a population[271], with all groups within the sample equally likely to be retained in follow-up or included in surveillance.

2.2.2 Confounding and the limitation of its impact

Confounding represents a further form of bias common to observational studies. In this sub-section I consider first the nature of confounding and the hierarchical relationship that can exist between factors. Within this framework I then discuss residual confounding and the issue it can pose.

Confounding. When examining a potential relationship between an exposure and an outcome, confounding refers to the measurement of the effect of a third factor, known as a confounding variable. A confounding variable is associated with an exposure while simultaneously affecting the measured outcome, but is not an intermediate link in the chain of causation between exposure and outcome[274]. In the present case, a factor influencing the probability of an early infant feeding practice may also be associated with risk of neonatal mortality. In instances where some mothers are both more likely to manifest a feeding practice hypothesised to be harmful, and also to have their infant die, an apparent association between the feeding practice and mortality risk may be observed, with the potential to falsely imply causation[133]. Confounding may also act to reduce the apparent benefit of an early infant feeding practice on mortality risk. For example, some studies on breastfeeding and infant mortality have observed that breastfeeding is more common among poorer than richer groups, but also that the infants of poorer mothers are more likely to die[281].

Where more than one potential confounding variable is identified, the relationship between them is often hierarchical, with a conceptual framework allowing for the identification of the inter-relationships between factors[282]. Types of confounders may be grouped by how distal or proximal they are as determinants of the measured outcome. For example, many health outcomes are distally related to socioeconomic status, which influences more proximal factors such as sanitation and nutrition.

Figure 2.1 describes a conceptual framework for the relationships between the determinants of early infant feeding practices and neonatal mortality. Arranged hierarchically, analyses of potential confounders of the relationship between

breastfeeding practices and infant or neonatal mortality or morbidity outcomes in the past have included the following categories:

- Socioeconomic status: maternal educational level[129,130,133,283], maternal literacy[203], social status of the household head[283], family income[129,133,284], household religion[129].

- Environmental characteristics: household sanitation and water supply[130,133,283], crowding[133], type of housing[283].

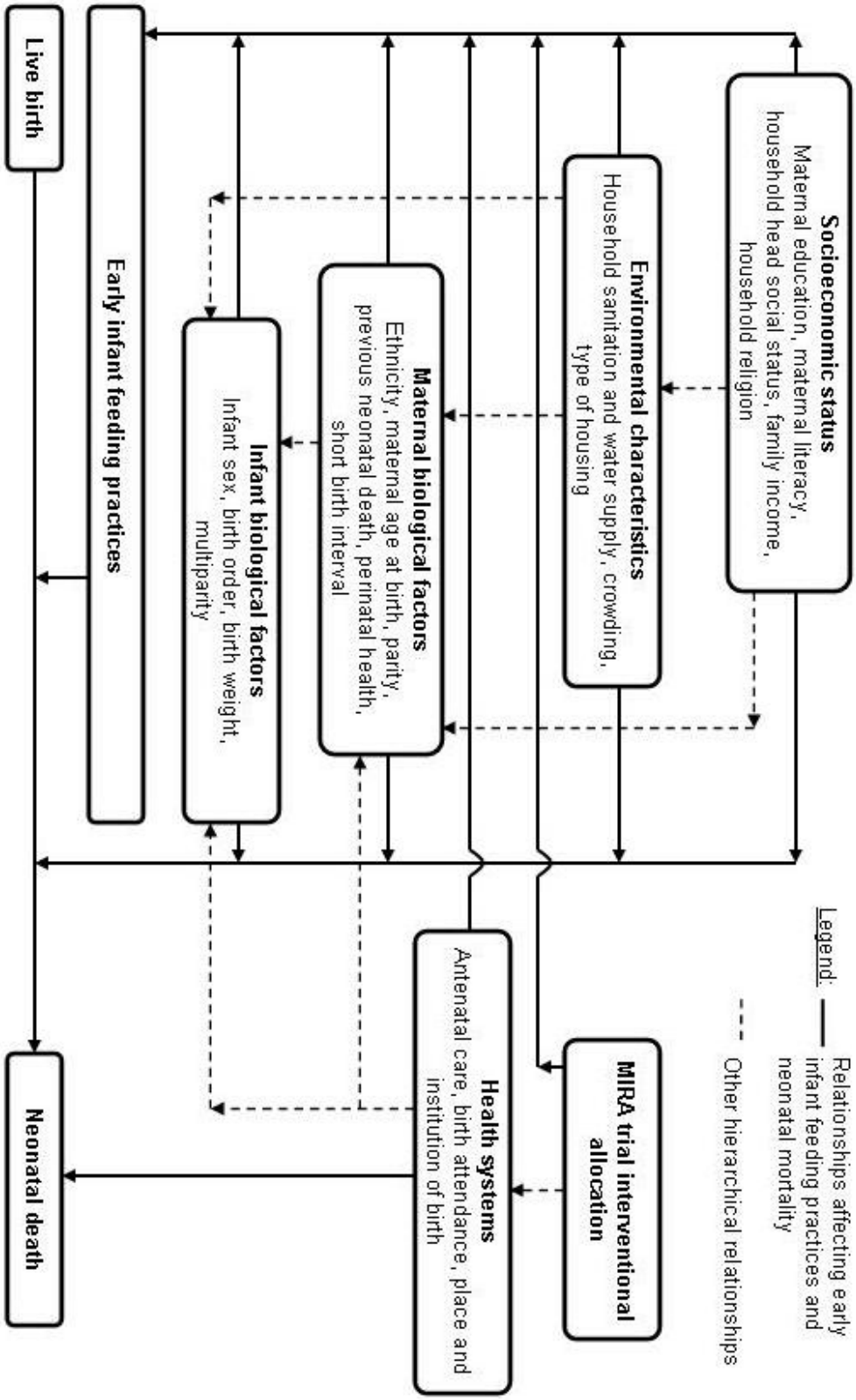
- Health systems: antenatal care [285], birth attendant[160], place and institution of birth[129,133,203].

- Maternal biological factors: ethnicity[133], maternal age at child's birth[129,133], parity[129], previous neonatal deaths[129], perinatal health[160], preceding short birth interval [133,283], propensity to recurrent short interpregnancy intervals[133].

- Infant biological factors: infant sex[130,133], birth order[130,133], birth weight[130,133,283,284], twin status[130].

A potential confounding variable of unique concern in this investigation is the trial interventional allocation that a mother falls within. Hierarchically, this may be placed in parallel with environmental characteristics and above health systems, as causally they locally influence health system usage (Figure 2.1).

Figure 2.1: Conceptual hierarchical framework for early infant feeding and neonatal mortality. Based upon Victora et al. 1997[282]



Approaches to limiting the influence of confounding include exclusion of some types of participant, stratification, and multivariable modelling techniques[274].

Residual confounding arises where a confounding factor remains unidentified, unmeasured, improperly measured, or immeasurable. One example may include personality-driven factors associated with both a mother's breastfeeding choices and how she cares for her infant, presenting a variable that is potentially unidentifiable or immeasurable. A further example may be presented if a mother were to ingest toxic substances which affected her propensity to breastfeed and the health of her infant, and the presence of such substances was unknown to a researcher. Residual confounding may also become an issue if, for example, birth weight was only approximately measured and not reliably recorded. Such factors cannot be readily included in multivariate analyses, potentially resulting in an overestimation of the effect of the exposure of interest on mortality. In sum, it is possible that, even after the restriction of the dataset and adjustment for confounding undertaken in my analyses, any association between colostrum discarding and neonatal outcomes could be confounded by unquantified (or unquantifiable) factors.

2.2.3 Reverse causality

Where an exposure and outcome are measured at the same time, reverse causality is introduced as a potential source of bias[286]. In the study of early infant feeding, if a mother reports that she delayed initiation or did not feed colostrum, it may be unclear whether the feeding practice influenced the risk of neonatal mortality, or whether complications leading to death also affected the infant's ability to feed or the mother's likelihood of offering milk. Such a reverse causation bias would lead to an overestimation of the harmful effect of reported colostrum discarding, prelacteal feeding or delayed breastfeeding initiation.

Several related methods can be considered in attempts to limit the influence of reverse causality bias when assessing the impact of early infant feeding practices on neonatal mortality[105], in situations where exposure and outcome are measured at the same time:

(i) Exclusion of neonatal deaths within the initial days or first week postpartum. This limits the number of infants included in analysis who were born with problems that inhibit ability to feed, and introduces a simulation of a temporal sequence of events. This method has been adopted by previous investigators in demonstrating an association between early initiation of breastfeeding and neonatal mortality[138,160], and an association between not breastfeeding and infant mortality[287]. The longer the initial period of exclusion, the more stringent the limit will be on the effects of reverse causality, but this benefit is gained against a trade-off of reduced total numbers of deaths upon which to base analysis.

(ii) Exclusion of infants who did not initiate breastfeeding at all. Such an approach is particularly valid in environments where absolute rates of breastfeeding are high, including in Nepal where 99% of infants are breastfed before 2 months of age[7].

(iii) Exclusion of types of infant known to be at a particularly high risk of death at birth, and for whom early breastfeeding practices may also be affected. Examples of such infants include low birth weight infants, twins and triplets, premature infants, infants born with congenital abnormalities, and those considered to be unwell on the day of birth.

(iv) Consideration only of neonatal deaths attributable to causes considered to be susceptible to a pathway influenced by early infant feeding practices. For example, accidental deaths and cases where maternal mortality occurred may be excluded.

The specific wording of a question on first milk in a questionnaire may also influence the extent to which reverse causality bias applies; ‘did you feed colostrum to the baby?’ may be anticipated to receive an altered pattern of responses from mothers compared to ‘did you throw away your first milk before feeding the baby for the first

time?' In instances where an infant born with difficulties suffered from an impaired ability to initiate feeding, a mother may feasibly respond that she did not feed colostrum to her newborn infant, not because she did not try, but because of preceding problems experienced by the infant. However, in the same scenario she would conceivably be less likely to report that she actively discarded some of her first milk if the question was worded to ask about active discarding of first milk.

2.2.4 Sample size

As is widely known, larger sample sizes have greater power to demonstrate differences in risk between exposure groups if they really exist, and they permit calculation of narrower confidence intervals.

Further demand for large sample sizes come from the fact that controlling for too many independent confounding covariates in a sample with too few outcome events of interest can cause overfitting[288]. Underfitting can also occur from a scarcity of outcome events, whereby the power to detect relationships amongst confounding covariates is low and so potentially important variables may be omitted from a model[288].

Since neonatal mortality is a somewhat rare event in proportional terms (particularly after exclusion of deaths to limit sources of bias as described above), large sample sizes (above 10 000) have been required in previous robust investigations of early infant feeding and neonatal mortality[137,138,160].

2.2.5 Further issues in analysis

A number of further analytical points require consideration in the examination of early infant feeding and neonatal mortality (and morbidity) outcomes using multivariable techniques.

Variable coding. A first consideration is that the way in which variables are coded in analysis will affect the interpretation of odds ratios produced. For example, coding the discarding of first breastmilk as 1 and absence of discarding as 0 may produce odds ratios describing a harmful effect of discarding on neonatal mortality risk, whereas the reversal of this coding may produce odds ratios describing a protective effect of no discarding.

Interaction effects. A second consideration is that interactions may occur between variables if the impact of one independent variable on the outcome of interest is modulated by the level of another independent variable. For example, previous investigators have observed that benefits associated with breastfeeding may be less marked in wealthier populations[279]. Interaction terms can be explicitly included in multivariable models, where they can be assessed for significance in the context of other variables in the model, although the risk of overfitting is correspondingly increased by adding further terms in this way[288].

Colinearity. An additional point to consider is that some variables will exhibit a large extent of mutual correlation. A potential example of such colinearity is the relationship between literacy and education. This is of particular note with regard to early infant feeding, since several dimensions of feeding were demonstrated to be potentially correlated with each other in Section 1.4. The results of a multivariable analysis that includes highly correlated variables may identify one or the other as significant, but it is unlikely that both will be identified. In such a situation, associated risk estimates for each variable may be imprecise. Typically, the most clinically relevant, amongst similar variables, are selected, unless the relationship between the two variables is itself under study[288].

Goodness-of-fit. Mathematical fit of a model concerns its effectiveness in predicting an outcome variable in the actual data. A number of 'goodness-of-fit' tests exist for its evaluation[289], although their results have rarely been presented in the literature on infant health effects of breastfeeding. Additional independent variables in a model tend to increase goodness-of-fit as long as problems with overfitting are not introduced.

Survival duration *vs.* dichotomous outcome. Some outcome measures, including mortality, can be treated as dichotomous or as a duration of survival[133]. While survival analysis grants greater statistical power, treating the dependent variable as dichotomous has practically the same statistical power as a survival analysis when the cumulative mortality rate is low, nominally below 5%[133]. Survival analysis is also based on several assumptions which may not be met in community surveillance data collected over several years, including that measurements from participants must be independent of each other, and that participants' survival prospects must be equal regardless of enrolment time in the study[290]. Data describing time to death must also be deemed to be reliable.

Treatment of missing data. Surveys have missing data for a range of reasons, including lost questionnaires, refusal to answer sensitive questions, procedural mistakes and data entry and computer errors[291]. Missing data exhibit one of three patterns: complete randomness, conditional randomness and systematically biased absence of data[291]. These types of missing data are respectively classified as missing completely at random (MCAR), missing at random (MAR), and not missing at random (NMAR). MCAR data occur when the probability of missingness is unrelated to other collected variables for which the study has data, and unrelated to the variable experiencing the missing values under question. MAR implies that the probability of missing data in one variable is influenced by values occurring in another variable, for which values are known. NMAR means that the probability of missingness is related to the values that are themselves missing, and presents the most problematic form of missing data in terms of analysis[291]. It may be difficult to determine the underlying mechanism for missingness, with underlying knowledge of the surveillance system and data entry provisions helpful in judging likely causes.

2.3 JUDGEMENT OF POTENTIAL CAUSAL ASSOCIATIONS

Inferring causation from association is an interpretive challenge and several criteria can be considered before deciding that causation is plausible. In his presidential address to the Royal Society of Medicine in 1965, Sir Austin Bradford Hill put forward nine considerations in assessing causality[292], which have been echoed elsewhere[274], including in the consideration of evidence specifically relating breastfeeding and infant outcomes[133,293]. Although none of the indicators in themselves imply causation, Hill's well-known criteria are a useful framework for thinking about the problems of interpreting data, and their cumulative presence allows for critical judgement of potential causal associations. Of the nine considerations (strength of association, consistency, specificity, temporality, dose response gradient, biological plausibility, coherence with existing knowledge, experimental evidence, analogy), six are particularly relevant to the study of early infant feeding practices and neonatal outcomes:

(i) *The strength of an association.* Whereas weak associations can easily be due to bias or confounding, very strong associations are less likely to be attributable to these causes. This is particularly the case if some causes of mortality are more strongly associated with exposure than others.

(ii) *Consistency.* A consistent observation of an association in different populations, at different times, and with different methodologies lends weight to the suggestion that there is a real effect. An association observed in one or two trials may be attributable to chance; if it is observed repeatedly then the plausibility of chance as an explanation is diminished. (There is however a need to consider potential publication bias, as absence of non-significant associations in published literature does not necessarily mean that they have not been discovered).

(iii) *Specificity.* A highly specific association with some outcomes but not others supports causality. For example, the causal pathways suggested in Figure 1.9 lead to the anticipation that risk of neonatal deaths due to infectious causes would be influenced by colostrum discarding, while risk

of asphyxia would not. However, lack of specificity does not imply lack of causation, since one risk factor may influence multiple outcomes. A related argument is that plausibility of causation increases if the distribution of causes of death differs between, for example, infants whose mothers reported discarding of colostrum compared to those who did not[133].

(iv) *Temporality.* Logically, a cause must precede an effect. While this is harder to determine for chronic exposures and outcomes, or cases where exposure and outcome are measured at the same time, steps to simulate temporality and limit reverse causality have been discussed above in Section 2.2.

(v) *Dose response gradient.* If an increasing exposure is associated with an increasing biological effect, this further supports a causal association. This has been particularly relevant in the investigation of breastfeeding initiation time and neonatal mortality risk, since greater delays have been associated with greater risks of neonatal mortality[160].

(vi) *Biological plausibility.* A number of biological mechanisms discussed in Sections 1.5 and 1.6 lead to a reasonable expectation that the discarding of first breastmilk may affect neonatal mortality risk. While biological plausibility aids in a suggestion of causality, weaknesses to this approach include the fact that associations can be causal despite their intermediate mechanisms not yet being fully understood, and seemingly plausible mechanisms can always be hypothesized and defended by researchers, potentially alongside other competing but equally plausible hypotheses.

While no single point should be taken alone to assert causation from observations, they do offer a guideline with which to critically appraise the potential of causality in a relationship[292].

2.4 CLUSTERED DATA

2.4.1 Why clustering in data collection is an issue

A key feature of data derived from clustered trial designs is that observations on individuals in the same cluster are likely to be correlated, a property known as intracluster correlation[294]. For data with a hierarchical or multi-level structure, approaches can be taken that allow for the fact that observations in the same group or cluster are more similar to each other than to observations in a different group. If data on individuals are analysed using standard methods that assume independence of observations, standard errors and confidence intervals are underestimated, and the statistical significance of any observed effects is exaggerated, leading to an inflated probability of Type I (false positive) error[294]. Where observations are highly correlated within clusters, ignoring a multi-level data structure can also result in biases in actual parameter estimates, not just their confidence intervals[295]. For data collected from a community-based surveillance system, clustering may be considered to occur at the level of the village, and potentially also at the level of the individual household if multiple infants are born within the period of study surveillance or if several mothers live in the same location.

2.4.2 Regression models that take clustering into account

Extensions of simpler regression models exist that allow for intracluster correlation, or equivalently between-cluster variation[294]. Random effects modelling and generalised estimating equations (GEE) are two modelling approaches that both adequately take into account hierarchically structured data, and have received wide attention.

Random effects models (also known as multi-level models) take account of between-cluster variation by assuming that there are random cluster level effects following a given probability distribution. They have been argued to be more suitable for rate data and continuous outcomes but potentially less suitable for binary outcomes[294]. This is because the logistic regression random effects model combines binomial variation within clusters and normally distributed variation between clusters, which does not provide a simple composite distribution, and so the normal distribution element is approximated by a series of 'columns' or 'slices' (termed quadrature) instead of resembling a continuous distribution[294]. The model fit is not necessarily always reliable for data with a binary outcome, although quadrature can be checked and the logistic regression random effects model is robust if quadrature provides an acceptable fit.

An alternative is provided by GEE[294]. GEE takes account of the correlations between observations within the same cluster, while not explicitly modelling the variation between clusters. It is assumed that observations on individuals in different clusters are uncorrelated, while observations on individuals in the same cluster all have the same correlation coefficient[294]. Regression coefficients and their standard errors are adjusted for correlations in the data, while parameters are interpreted as population averages. In contrast, interpretation of parameters generated from random effects models are cluster-specific[296]. Although standard maximum-likelihood ratio tests for model fit cannot be used for GEEs, other tests with the same practical application are available in instances with binary dependent variables[297].

In practice there is little to choose between the two analytical methods and both are adequate in accounting for clustering in data, usually giving similar results (cluster-specific odds ratios always take a parameter estimate slightly further from 1.0 compared to population-averaged odds ratios). Arguably one distinction is that random effects regression corresponds to a full probability model for the data, conferring the advantage of allowing use of the likelihood ratio test in statistical inference[294]. The variation between clusters may also be investigated as a property of interest in itself with random effects modelling.

CHAPTER 3: MAKWANPUR AND DHANUSHA QUANTITATIVE STUDY METHODS

3.1 MAKWANPUR DISTRICT

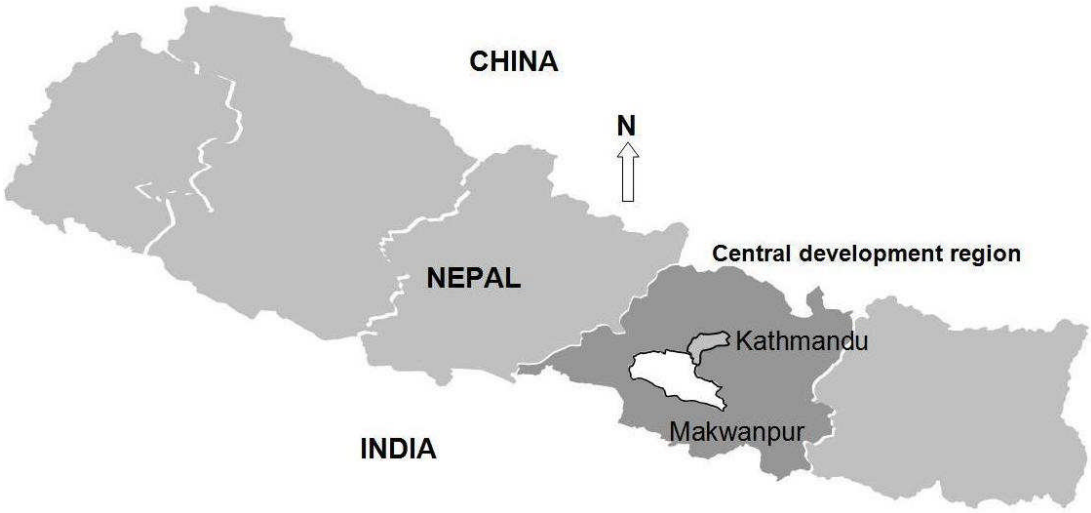
In 2001 a Nepali NGO, Mother and Infant Research Activities (MIRA), in partnership with the UCL Centre for International Health and Development (CIHD), initiated a cluster randomised controlled trial in Makwanpur district, Nepal, to evaluate a community-based participatory intervention of women's group meetings[298]. The branch of the MIRA organisation operating in Makwanpur is called MIRA Makwanpur. Spanning two phases from 2001 to 2008, surveillance of the trial was conducted across the majority of administrative regions within Makwanpur, monitoring a wide range of measures in households, including neonatal mortality and newborn care practices. The data collected from the surveillance system afforded the opportunity to investigate relationships between early infant feeding practices and neonatal mortality, while providing information on a wide range of potential confounding variables.

The results produced from this data contribute a substantial component of the evidence considered in the thesis. In this section I describe the Makwanpur study site. Details of the original study design and data collection methods follow in Sections 3.2 and 3.3. A similar trial was conducted by MIRA in Dhanusha district, Nepal, described later in the chapter. I then describe the methodology used in statistical analysis for data from both projects.

3.1.1 Setting

Makwanpur district is located to the south west of Kathmandu, in the Central Development Region of Nepal. Map 3.1 shows its location relative to Kathmandu and Nepal. The topography of Makwanpur is mixed, with low flat plains to the south, and hills to the north. Its total area is 2426 square kilometres[299]. There are two large motorable roads in the district, including one major channel that continues from Kathmandu to India.

Map 3.1: Location of Makwanpur district in Nepal



Daytime temperatures in the district capital, Hetauda, range from 5°C to 25°C in January, peaking at a range of 19°C to 37°C in May[299], after which time the monsoon season runs from June to September, moderately lowering ground temperatures. Precipitation in Hetauda is typically greater than 2000 mm per year.

Makwanpur is divided into 43 administrative regions, known as Village Development Committees (VDCs), in addition to one municipality, Hetauda. The total population of Makwanpur, based on figures from Nepal's most recent census in 2001, was

393 000 spread across 71 000 households[299], but is likely to have grown in the past decade, with an estimated population of 460 000 in 2008[300]. The majority of residents are engaged in subsistence agriculture. Further population indicators of Makwanpur, based upon the Nepal 2001 census, are shown in Table 3.1[299]. The human development index is 0.479, ranking Makwanpur 31st relative to the other 74 districts of Nepal, and life expectancy at birth is 56[301]. The GDP per capita at purchasing power parity in 2001 was US$1836[302].

The ethnic composition of Makwanpur is mixed, with Tamangs (a predominantly Buddhist Tibeto-Burman group) representing the largest single group, followed by Brahmins and Chhetris (a predominantly Hindu group of Indo-Aryan origin). District Development Committee records suggest that 46% of the population are Tamang, followed by Brahmin/Chhetri (25%), Newar (8%) and Magar (5%)[303]. However, pre-trial baseline data collected by MIRA Makwanpur suggested that the ethnic mix was closer to 65% Tamang and 17% Brahmin or Chhetri[304]. Tamang is correspondingly a major language spoken in Makwanpur, alongside Nepali. Newar and Brahmin-Chhetri groups tend to be wealthier than Tamangs.

Table 3.1: Population indicators of Makwanpur district, Nepal 2001 census[299]

Population	392 604
Mean household size	5.52
Sex ratio (males/females)	1.029
Religion	
Buddhist (%)	47.6
Hindu (%)	49.4
Christian (%)	2.1
Islam (%)	0.3
Other (%)	0.6
Literacy ("able to read & write") age 6 yrs+	
Total (%)	63.2
Male (%)	72.4
Female (%)	53.7

3.1.2 Health system

Each VDC contains one governmental health institution of variable size, which may be a primary health centre, health post, or sub health post. Perinatal care is provided from these facilities and the district hospital, as well as by traditional birth attendants. There are approximately 1200 institutional deliveries per year in Makwanpur[305]. Table 3.2 indicates current numbers of health institutions and health workers in Makwanpur, based on District Health Office reports[305].

Table 3.2: Numbers of health institutions and health workers in Makwanpur district, Nepal[305]

Health Facilities	Number
District hospital (Hetauda)	1
Primary health centre	4
Health post	10
Sub health post	30
Health Workers	
Auxiliary nurse midwife (ANM)	40
Maternal and child health worker (MCHW)	30
Village health worker (VHW)	20
Auxiliary health worker (AHW)	43
Hospital staff nurse	10
Health assistant	14
Doctor	14
Population per doctor	29 000

Baseline data collected by MIRA Makwanpur in 2000 suggested a NMR of 25 deaths per 1000 live births, and indicated that 90% of women give birth at home[304]. Skilled attendance at birth (doctors, nurses, ANMs, health assistants) covered 6% of births, while traditional birth attendants covered 5%[304]. The region is not greatly affected by AIDS or malaria.

3.2 MIRA MAKWANPUR AND THE COMMUNITY-BASED PARTICIPATORY INTERVENTION WITH WOMEN'S GROUPS

The participatory intervention of women's group meetings facilitated by MIRA Makwanpur is not the focus of investigation in the thesis. The intervention is, however, the basis upon which MIRA Makwanpur's community surveillance system was designed, which in turn afforded the opportunity for further analysis. Before describing the NGO's data collection methods in the district, I describe the women's group intervention and its random allocation to a selection of VDCs within Makwanpur.

MIRA has been working in Nepal since 1992 and has been operating in Makwanpur district since 1999. MIRA Makwanpur is headquartered in the district capital Hetauda. One of its primary activities has been to coordinate a cluster randomised controlled trial to assess the impact of monthly women's meetings on neonatal mortality, in addition to a number of other neonatal and maternal health outcomes. The intervention itself involved a participatory action cycle including identification by group members of locally pertinent perinatal problems, prioritisation and planning of strategies to address those priorities within each group, and frequently the involvement of wider community members in the implementation of strategies[306]. Most group members were illiterate[306]. Meetings were facilitated by paid, literate, locally based women, who convened the groups monthly. Figure 3.1 displays an example of a women's group meeting held in Makwanpur.

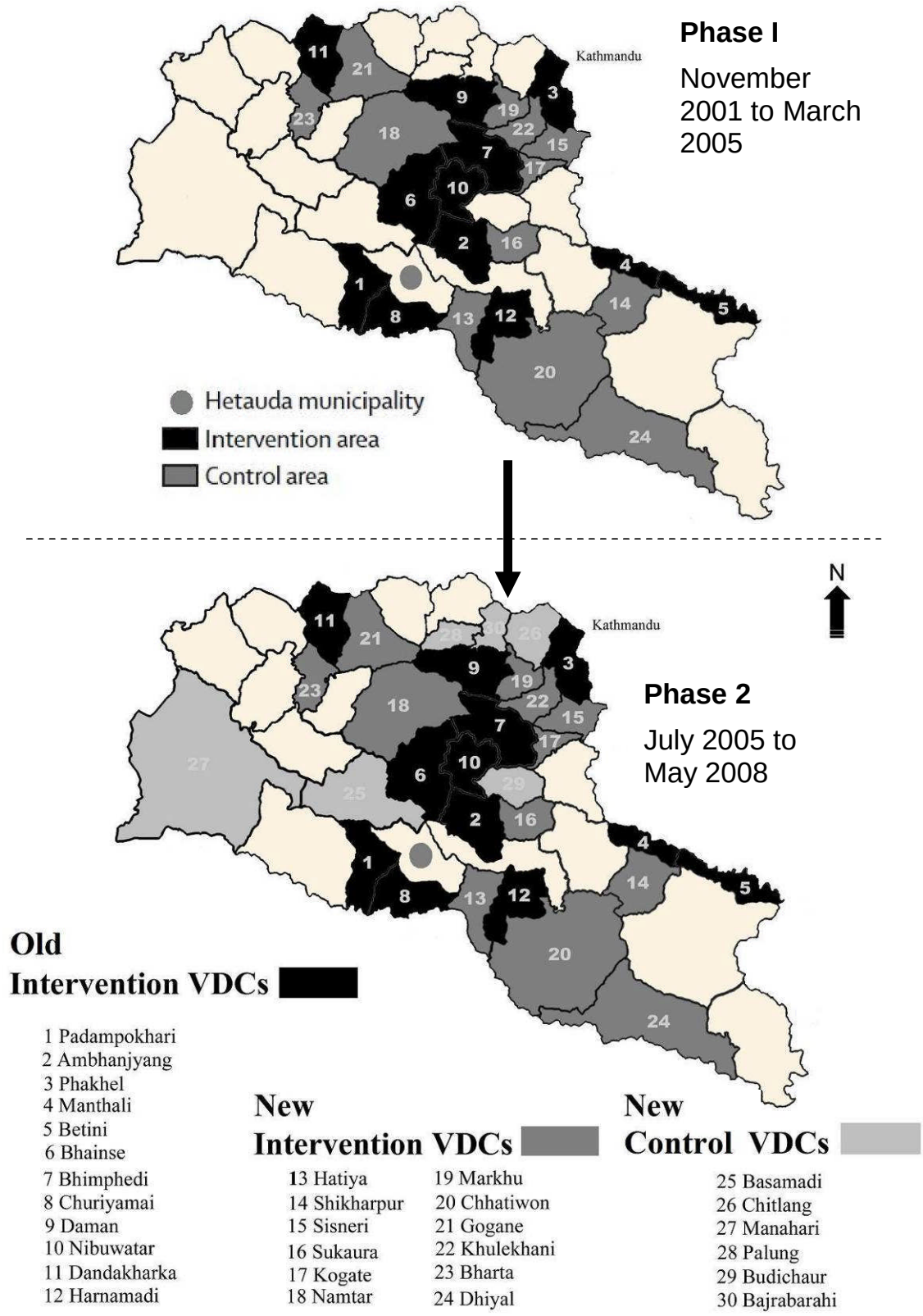
Figure 3.1: Example of a Makwanpur women's group meeting

Photo courtesy of Thomas Kelly and Save the Children, USA.

Figure 3.2 shows the Village Development Committee administrative regions of Makwanpur by trial allocation. The trial ran in two phases, starting in November 2001 and ceasing group activities in May 2008. The study population for Phase I was located within a random sample of 24 VDCs in Makwanpur district – 12 VDCs were treated as control clusters and 12 VDCs were treated as intervention clusters. In Phase I (November 2001 to March 2005) MIRA Makwanpur worked with a population of 170 000 covering 1600 km^2, during a time of political instability. In July 2005 the trial was expanded to include six new control clusters, bringing the total included population to 210 000, and the 12 former control clusters started to receive the women's group intervention (VDCs 13-24, Figure 3.2). Of the 12 new intervention clusters, seven started to receive the intervention in July 2005 (VDCs 13,15,16,17,19, 22 and 24), whereas the remaining five started a year later in July 2006 (VDCs 14, 18, 20, 21, 23) due to pronounced political instability in these VDCs.

Published results from Phase I of the trial indicated that the neonatal mortality rate and maternal mortality ratio were significantly reduced in intervention clusters compared to control clusters, while women in intervention clusters were more likely to have antenatal care, institutional delivery, trained birth attendance, and hygienic care than were controls[174]. Initiation of breastfeeding within one hour and discarding of colostrum were suggestively but not significantly beneficially associated with interventional allocation.

Figure 3.2: Makwanpur women's group trial allocation by VDC cluster, Phase I to Phase II



Adapted from MIRA Makwanpur internal resources.

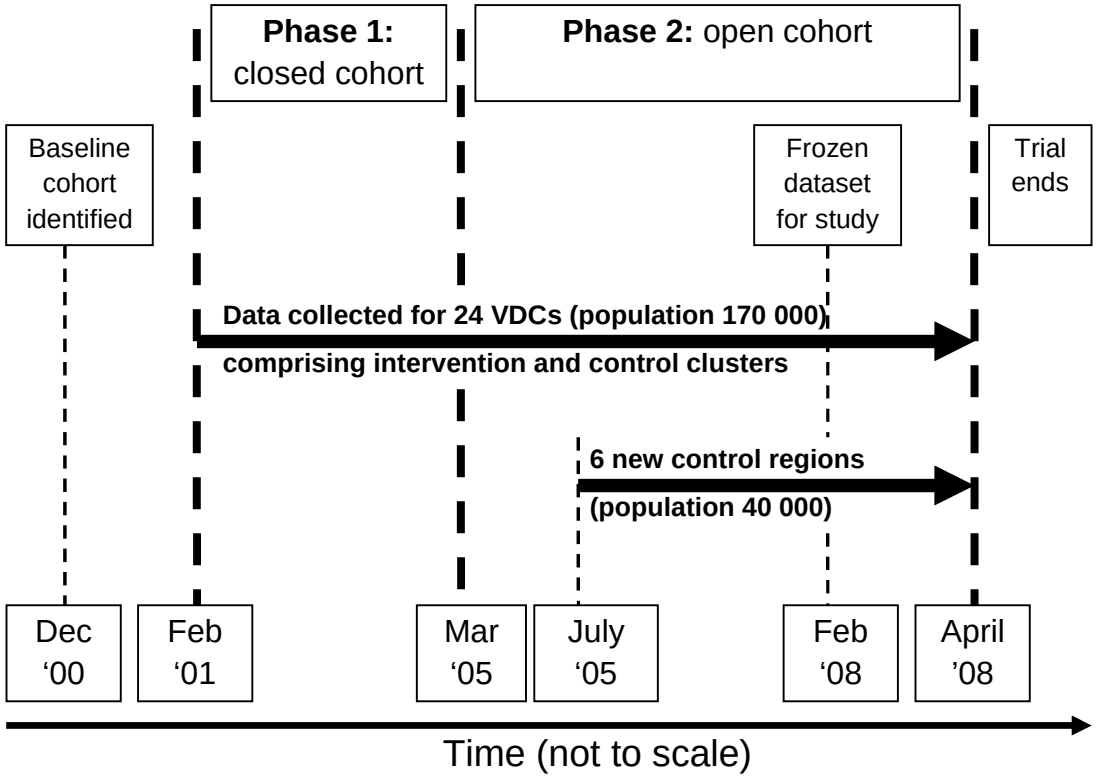
3.3 MAKWANPUR DATA COLLECTION AND MANAGEMENT

3.3.1 Surveillance participant inclusion criteria

For the study purposes, married women aged 15 to 49 years inclusive were classified as married women of reproductive age (MWRA). Phase I data collection involved identification and follow-up of a closed cohort of all MWRA in the initial 24 study VDCs. These women were identified before the trial's start, in November 2000. Women who were not married, or not aged 15 to 49 years, or unable to conceive at this time were not included in surveillance, and no further participants were enrolled during the Phase I study period. Phase II pursued an open cohort of MWRA. The participant inclusion criteria were the same as in Phase I, except that any married woman aged 15 to 49 years living in the expanded 30 trial VDCs could be included.

Surveillance began in February 2001 for Phase I, initially involving 28 931 participants in the closed cohort[174]. Surveillance was no longer restricted to the original closed cohort from March 2005, coinciding with initiation of Phase II of the trial. Although data collection continued until 28 April 2008 in all study VDCs, the data analysed for the purposes of the thesis were from an intermediate dataset frozen on 1 February 2008. A timeline of data collection is shown in Figure 3.3.

Figure 3.3: MIRA Makwanpur women's group trial, Phases I and II, data collection timeline



3.3.2 Surveillance network

In order to detect pregnancies, births, and their outcomes prospectively, a network of salaried local female enumerators was responsible for recording the menstrual status of participants. All enumerators were educated to grade five in the Nepali education system as a prerequisite for consideration for recruitment. Each enumerator visited all women in the area she was responsible for, every month, recording menstrual status and subsequent instances of pregnancy, miscarriage, stillbirth, or live birth, as well as instances of participant death, spouse death, or menopause. In the absence of other explanatory circumstances, pregnancy was registered when a participant ceased menstruation for three months. Fetal death at 28 weeks gestation or more, but before delivery of the infant's head, was registered

as a stillbirth. Cessation of pregnancy before 28 weeks was classified as a miscarriage. For Phase I there were 255 enumerators, and for Phase II there were 321. There were a minimum of nine and maximum of 25 enumerators per VDC.

The next level in the MIRA Makwanpur surveillance system was that of the interviewers (termed VDC Interviewers or VDCIs), responsible for collection of data from study participants via questionnaire. Interviewers were local to the VDC they worked within, could be male or female, and were educated to a minimum of grade ten in the Nepali education system as a prerequisite for consideration for recruitment. Recruitment was subsequently decided on the basis of written examination, interview, and preference for speakers of predominant languages in a VDC.

Enumerators reported detected pregnancies and live and stillbirths to interviewers in weekly meetings; one interviewer covered each VDC. Acting upon this notification, for every pregnancy interviewers conducted a questionnaire at seven months gestation (during Phase I only) and subsequently visited mothers at least 28 days after the date of birth reported by enumerators, in order to capture information upon completion of the neonatal period (during both Phases I and II). Data was collected via questionnaire, as described further below. The data collected at one month postpartum form the basis of the thesis investigation. Interviewers were supervised by a team of nine field coordinators, who monitored 10% of questionnaires taken, and who were responsible for conducting interviews with mothers in cases of neonatal death. In instances of maternal death, field coordinators conducted the interview with another available relative in the household.

Maoist insurgency affected data collection. Some VDCs commenced surveillance later than others. Although each questionnaire was intended to be taken 28 days after birth, visits by interviewers were at times delayed by days or weeks due to insurgency as well as festivals or respondents not being available for other reasons. However, all enumerators maintained regular monitoring of pregnancy status, and questionnaires were successfully taken by interviewers, if after a delay. Neonatal deaths were only registered if the date of death was reported to have occurred within the first 28 days postpartum, regardless of interview delay – deaths after four weeks were not registered as neonatal deaths in instances of interviewer delay.

3.3.3 Questionnaire research tools

The questionnaires were modular and contained sections determining maternal background and events in pregnancy, as well as collecting information on the newborn infant. About mothers, questions were asked on ethnicity and religion, household asset ownership, education, antenatal care, health problems in pregnancy and health service usage. About newborn infants, questions included those on sex, gestational age, newborn care, morbidity indicators, and breastfeeding.

The questionnaire taken by interviewers in Phase I is shown in Appendix B. The questionnaire taken in Phase II is shown in Appendix C. A closed range of potential responses was offered, in addition to some open text responses. The Phase I questionnaire was developed in Nepali and piloted within four VDCs, with further revisions for Phase II. The questionnaires presented to mothers in Phases I and II therefore differed slightly, but the range of questions, question wording, and potential responses were similar enough for data from the two sources to be merged coherently.

In the case of stillbirth or neonatal death, further verbal autopsy questions were asked on details of perinatal events and morbidity indicators in order to establish cause of death. The verbal autopsy component of the questionnaires was partially based upon original tools developed by WHO[307], combining open-ended narrative with closed questions. For Phase I, classification of the data was conducted by a paediatrician (Dr D Osrin) and classified against 14 causes of stillbirth or neonatal death based on those used by SEARCH in India[53,174]. For Phase II, review was conducted independently by two paediatricians (Dr SR Manandhar and Dr A Ojha). Cases in which the two paediatricians did not agree were discussed with a consultant neonatologist (Prof DS Manandhar) and assigned by consensus. Potentially classifiable causes of neonatal mortality were birth asphyxia, severe infection, prematurity or low birth weight, hypothermia, congenital malformation, accident or external condition, other or unclassifiable. The classification system used for cause of neonatal death is shown in Appendix E.

3.3.4 Data management

In addition to observing 10% of interviews, field coordinators reviewed all questionnaires before transfer to data auditors in the MIRA Makwanpur central office in Hetauda. The process of audit and correction occasionally resulted in transfer of a questionnaire back for re-collection or correction. Data were double-entered into a database management system constructed in Microsoft SQL Server 7.0 (Microsoft Corporation, Redmond, WA, USA). The data entry system was constructed with Visual Basic 6.0 (Microsoft Corporation, Redmond, WA, USA), and was programmed to only accept entries within pre-defined constraints, as a further data quality measure. Data were retrieved using Microsoft Access 2003 (Microsoft Corporation, Redmond, WA, USA).

3.3.5 Ethical approval

The study was approved by the Nepal Health Research Council and the ethics committee of the Institute of Child Health and Great Ormond Street Hospital for Children. Further research activities and analyses conducted within the study's framework fell within this ethical provision. Participant confidentiality was ensured through the coding of mothers and infants to unique identification numbers, and removal of name data.

3.4 DHANUSHA DISTRICT

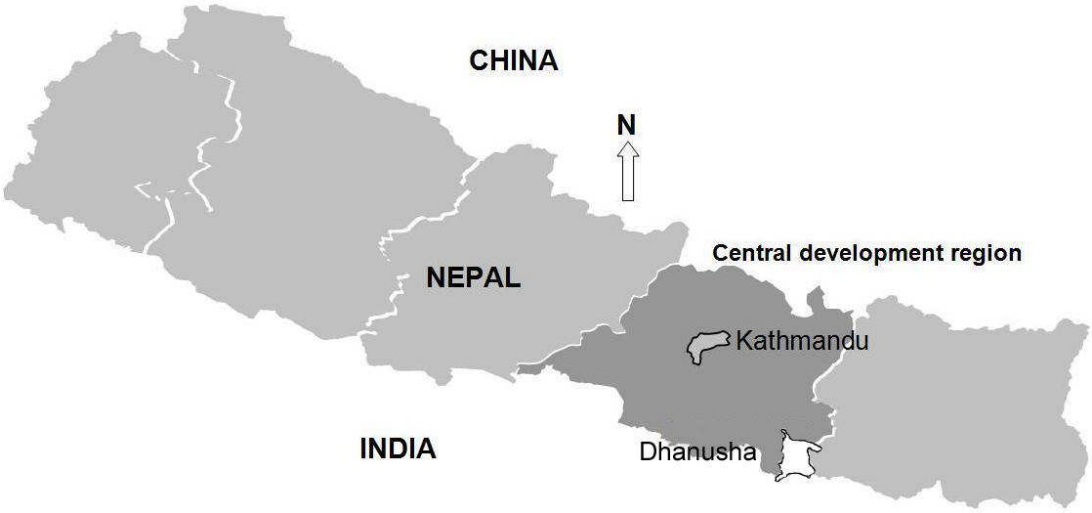
In 2006, MIRA and UCL CIHD initiated another cluster randomised controlled trial with a factorial design in Dhanusha district, Nepal. There were two original purposes of this study. One was to examine whether the positive findings on the women's group community-based participatory intervention in Makwanpur could be replicated in an ethnically and culturally different context within Nepal in a more scalable, low-cost way. The other purpose was to evaluate the effects on maternal and newborn health of a community-based intervention of training Female Community Health Volunteers in care and sepsis management of vulnerable newborn infants. The branch of the MIRA organisation operating in Dhanusha is referred to as MIRA Dhanusha. Continuing from late 2006 to the present day, surveillance for the trial was conducted across 60 VDCs within Dhanusha, monitoring a wide range of measures in households, including neonatal mortality and newborn care practices, with survey methods largely based upon those previously used by MIRA Makwanpur. The data collected from the surveillance system afforded the opportunity to investigate relationships between early infant feeding practices and neonatal mortality, while providing information on a wide range of potential confounding variables.

The results produced from this data contribute a substantial component of the evidence considered in the thesis. In this section I describe the Dhanusha study site. Details of the original study design and data collection methods follow in Sections 3.5 and 3.6. I then describe the methodology used in statistical analysis of data from both the MIRA Makwanpur and MIRA Dhanusha projects.

3.4.1 Setting

Dhanusha district is located to the south east of Kathmandu, in the Central Development Region of Nepal, bordering Bihar state, India, to the south and Nepal's Eastern Development Region to the east. Map 3.2 shows the location of the district relative to Kathmandu and Nepal. The topography of Dhanusha is primarily that of flat and fertile plains. Its total area is 1180 square kilometres[299]. As a plains district, Dhanusha benefits from more developed communications than Makwanpur, with several major motorable roads in the district, including the H01 highway that crosses Nepal. Dhanusha also contains the only railway in Nepal.

Map 3.2: Location of Dhanusha district in Nepal



Daytime temperatures in the district capital, Janakpur, range from 9°C to 24°C in January, peaking at 23°C to 39°C in May and June[299], although temperatures remain similarly elevated until September. Dhanusha is somewhat drier in climate than Makwanpur, with recorded precipitation rarely above 1300 mm in Janakpur.

Dhanusha is divided into 102 VDCs, in addition to one municipality, Janakpur. The total population, based on figures generated from Nepal's most recent census in 2001, was 671 000 spread across 117 000 households[299], but is likely to have grown in the past decade, with an estimated population of 777 000 in 2008[300], making Dhanusha the fifth most populous district of Nepal. The male population recorded in the 2001 census was 349 000, compared to a female population of only 322 000[299], suggesting a skewed sex ratio. The majority of residents are engaged in subsistence agriculture, with 89% residing in rural areas[300]. Further population indicators, based upon the Nepal 2001 census, are shown in Table 3.3[299]. The human development index is 0.449, ranking Dhanusha 43rd relative to the other 74 districts of Nepal, and life expectancy at birth is 62[301]. The GDP per capita at purchasing power parity in 2001 was US$994[302].

As the former capital of the Mithila kingdom, and featuring prominently in the Hindu epic Ramayana, the district capital Janakpur holds particular historical and cultural significance. Linguistically and culturally, Dhanusha is predominantly Maithili and a large majority of its population – 90% – are Hindu[299]. After Maithili, Nepali is the second most predominant mother tongue. Major ethnic groups of Dhanusha include Yadav/Ahir (21%), Sudhi/Kalwar/Teli (11%), Muslim (8%), Dalit (untouchable) groups (8%), Kebut (6%), Dhanuk (5%), Koili (5%), Hill Brahmin (4%) and Tatma (3%)[299]. Since late 2006, Dhanusha has been affected by ethnically motivated conflict revolving around Terai Madhesi rights, in addition to the wider civil conflict between the state and Maoists, which particularly affected the district between 2002 and 2006.

It is important to note that ethnically and culturally, Dhanusha and Makwanpur are distinct from each other, despite both being found in the Central Development Region of Nepal. Makwanpur represents a hill district, while Dhanusha is ethnically, linguistically and culturally closer to the Gangetic plains of northern India, sharing an open border with Bihar state, across which marriages frequently occur. For example, Hinduism is more dominant in Dhanusha, Islam is more common, and Buddhism is relatively rare. Comparison of Makwanpur and Dhanusha provides contexts as sufficiently alternative as if they were located in different countries.

Table 3.3: Population indicators of Dhanusha district, Nepal 2001 census[299]

Population	671 364
Mean household size	5.72
Sex ratio (males/females)	1.085
Religion	
Buddhist (%)	1.4
Hindu (%)	90.1
Christian (%)	0.0
Islam (%)	8.4
Other (%)	0.1
Literacy ("able to read & write") age 6 yrs+	
Total (%)	48.3
Male (%)	59.6
Female (%)	36.1

3.4.2 Health system

The number of institutional deliveries per year ranges from 6000 to 8500[308]. Table 3.4 indicates current numbers of health institutions and health workers in Dhanusha, based on District Health Office reports[308].

Table 3.4: Numbers of health institutions and health workers in Dhanusha district, Nepal[308]

Health Facilities	
District hospital (Janakpur)	1
Primary health centre	5
Health post	9
Sub health post	88
Health Workers	
Auxiliary nurse midwife (ANM)	27
Maternal and child health worker (MCHW)	83
Village health worker (VHW)	90
Auxiliary health worker (AHW)	149
Hospital staff nurse	24
Health assistant	21
Doctors	29
Population per doctor	23 000

Baseline data collected by MIRA Dhanusha in 2006 indicated that the NMR was 40 deaths per 1000 live births[309]. 87% of women gave birth at home. Skilled attendants (doctors, nurses, ANMs, health assistants) were present at 18% of births, while traditional birth attendants covered 33%. The region suffers a low endemic burden of malaria, primarily *Plasmodium vivax*.

3.5 MIRA DHANUSHA AND A FACTORIAL CLUSTER RANDOMISED TRIAL EVALUATING TWO INTERVENTIONS

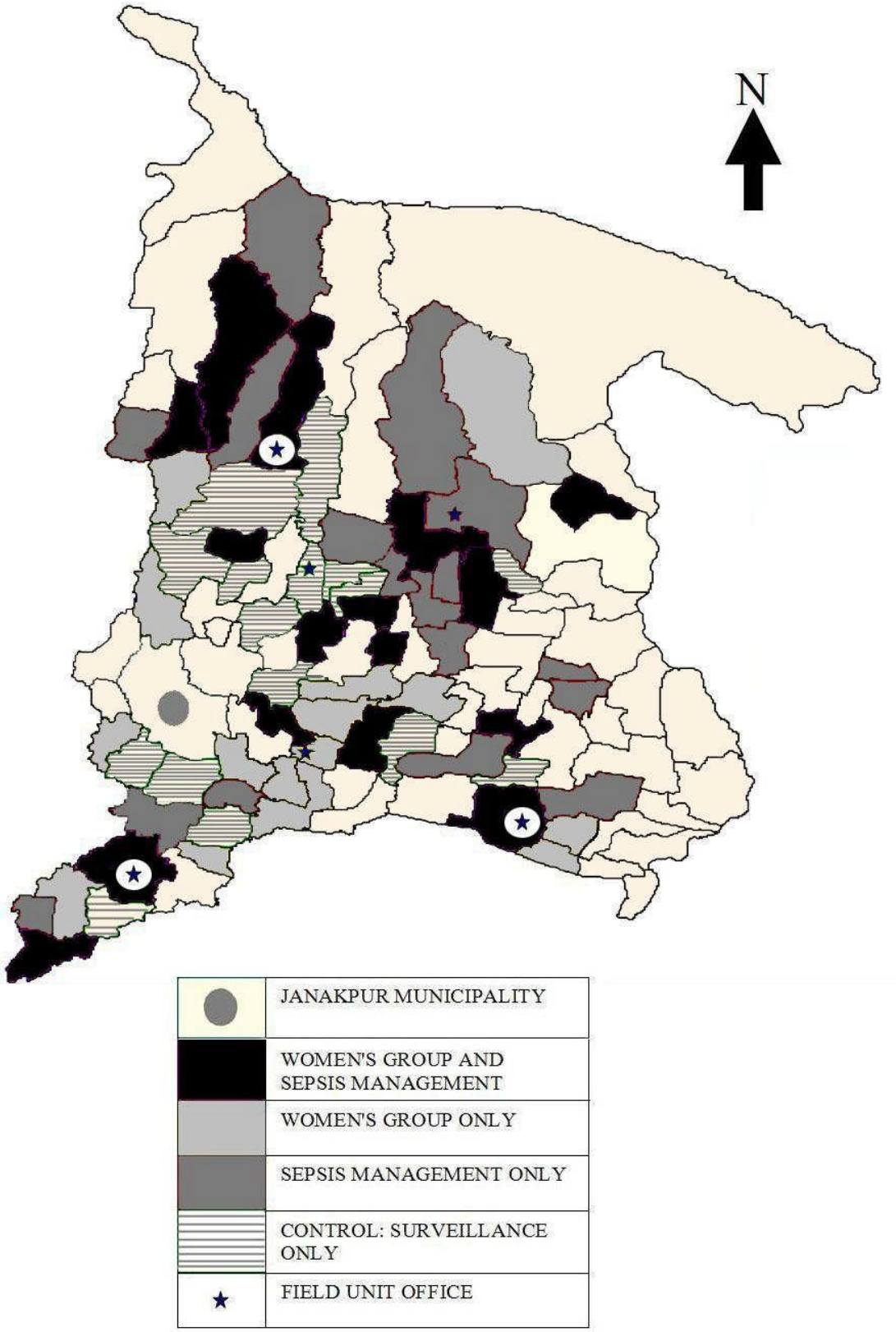
Two interventions are being evaluated by MIRA Dhanusha as part of a factorial cluster randomised controlled trial. The interventions are not the focus of investigation in the thesis, although they are the basis upon which the community surveillance system was designed, which in turn afforded the opportunity for further analysis. Before describing the NGO's data collection methods in the district, I describe the interventions and their random allocation to a selection of VDCs within Dhanusha. This is of potential importance, as for the purposes of the thesis interventional allocations represent possible confounding factors.

MIRA Dhanusha is headquartered in the district capital Janakpur. One of its primary activities has been to coordinate a factorial cluster randomised controlled trial to assess the impact of two interventions on neonatal mortality and other neonatal and maternal health outcomes. One intervention is that of the women's group community participatory action cycle, as described for Makwanpur. The other intervention comprises community-based training of Female Community Health Volunteers (FCHVs) to care for vulnerable newborn infants and manage sepsis. This training enables FCHVs to identify low birth weight infants, identify potential newborn infection, manage the process of treatment and referral, and follow up infants and support families[310].

Figure 3.4 shows the Village Development Committee administrative regions of Dhanusha by trial allocation. The trial began in November 2006 and continues to the present day. MIRA Dhanusha has been working with an open cohort of approximately 420 000, including 56 000 married women of reproductive age and around 14 000 annual births[309].

The study population was located within a random sample of 60 VDCs in Dhanusha district. 30 VDCs were allocated as control clusters and 30 VDCs were allocated as intervention clusters for the women's group intervention. The trial design specified a further factorial split into 30 intervention and 30 control VDCs for the FCHV intervention. However, there were only 23 intervention VDCs for the FCHV sepsis management intervention compared to 37 control VDCs, due to local security difficulties. As a result of this allocation, 14 VDCs received both interventions, 16 received women's groups only, 9 received sepsis management only and 21 received neither. Women's group interventional allocation has already been described above as a possible confounding variable, with the potential to influence neonatal mortality risk and early infant feeding behaviours. The FCHV training interventional allocation may also represent a potentially confounding variable.

Figure 3.4: Dhanusha intervention allocation by VDC cluster



3.6 DHANUSHA DATA COLLECTION AND MANAGEMENT

3.6.1 Surveillance participant inclusion criteria

Married women aged 15 to 49 years inclusive were classified as married women of reproductive age (MWRA). Women who were not married, not aged 15 to 49 years, or unable to conceive at this time were not included in surveillance. An open cohort of MWRAs has been pursued throughout the study: births were identified for any woman who met the inclusion criteria.

Surveillance began on 17 September 2006. FCHV trial implementation began in November of the same year, and the women's group trial implementation began on 1 May 2007. The first months of surveillance constituted a baseline period (17 September 2006 to 30 April 2007). Although data collection continues to the present, the data analysed for the purposes of the thesis were from an intermediate dataset frozen on 1 June 2009 (with cases complete to 10 April 2009).

3.6.2 Surveillance network

The surveillance network of MIRA Dhanusha is similar to that of MIRA Makwanpur. In order to detect pregnancies, births, and their outcomes prospectively, a network of local female enumerators was responsible for recording the menstrual status of participants. A key difference in the enumerator incentive structure compared to MIRA Makwanpur was that workers were paid by event recognised, and not on a standardised monthly salary. This system may further reduce the risk of missed

birth and death events, while the risk of fictitious recorded events is minimised through supervisory follow-up of vital events enumerated. There were 311 ward enumerators, averaging over five per VDC.

As in Makwanpur, all enumerators were educated to grade five in the Nepali education system as a prerequisite for consideration for recruitment. Each enumerator visited households in the area she was responsible for, every month, recording stillbirth, or live birth, as well as instances of neonatal death, deaths of females aged 10-49 years, and deaths of children aged less than five years. Fetal death at 28 weeks gestation or more, but before delivery of the infant's head, was registered as a stillbirth.

Interviewers formed the next level in the MIRA Dhanusha surveillance system, in a similar fashion to that of MIRA Makwanpur. Enumerators reported detected live and stillbirths and deaths to interviewers in weekly meetings; one interviewer typically covered two VDCs and there were a total of 31-35 interviewers covering the 60 study VDCs. For every birth, interviewers visited mothers after 28 days from the date of birth reported by enumerators in order to capture information upon completion of the neonatal period. Data were collected via questionnaire, as described further below. Interviewers were supervised by a team of 7-9 field coordinators, who observed 10% of interviews, and who were responsible for conducting interviews with mothers or families in cases of neonatal death.

Civil unrest affected surveillance in Dhanusha quite severely, particularly throughout 2007. Although each questionnaire was intended to be taken 28 days after birth, visits by interviewers were at times delayed by days or weeks. However, all enumerators maintained regular monitoring of vital events, and questionnaires were successfully taken, if sometimes after a delay. Neonatal deaths were only registered if the date of death was reported to have occurred within the first 28 days postpartum, regardless of interview delay – deaths after 4 weeks were not registered as neonatal deaths in instances of interviewer delay. In contrast to Makwanpur Phases I and II, post-neonatal infant deaths and deaths of children aged 1-5 years were also enumerated, although only data for the neonatal period were relevant to the thesis investigation.

3.6.3 Questionnaire research tools

The questionnaires were modular and contained sections describing maternal background and events in pregnancy, as well as sections collecting information on the newborn infant. For the mother, questions were asked on maternal ethnicity and religion, household asset ownership, household food security, education, antenatal care, nutritional practices in pregnancy and postpartum, health problems in pregnancy and health service usage, plus exposure to the women's group intervention and a government institutional delivery incentive scheme. For the newborn infant, questions covered sex, gestational age, newborn care, morbidity indicators, breastfeeding and infant feeding practices, and sepsis management relevant to the FCHV sepsis management intervention under investigation.

A closed range of potential responses was offered, in addition to some open text responses. The questionnaire was developed in Nepali and piloted, with feedback and revision after 2-3 months (during baseline) and again (with only minor changes to wording of questions) in several later instances. The version of the questionnaire that is most recent and was most used by interviewers is shown in Appendix D.

In the case of stillbirth or neonatal death, a further verbal autopsy questionnaire was administered on details of perinatal events and morbidity indicators, in order to establish cause of death. Open-ended narrative was combined with closed questions. Review and classification of this data was conducted independently by two paediatricians (Dr SR Manandhar and Dr A Ojha). Cases in which the two paediatricians did not agree were discussed with a consultant neonatologist (Prof DS Manandhar) and assigned by consensus. Potential classifications were the same as those described for Makwanpur. Potentially classifiable causes of neonatal mortality were birth asphyxia, severe infection, prematurity or low birth weight, hypothermia, congenital malformation, accident or external condition, other or unclassifiable. The classification system used for cause of neonatal death is shown in Appendix E.

3.6.4 Data management

In addition to observing 10% of interviews, field coordinators reviewed all questionnaires before transfer via field unit offices to data auditors in the MIRA Dhanusha central office in Janakpur. The process of audit and correction occasionally resulted in transfer of a questionnaire back for amendment or re-collection of answers to certain questions. Data were entered into a database management system constructed in Microsoft Access 2003 (Microsoft Corporation, Redmond, WA, USA). The data entry system was constructed with Visual Basic 6.0 (Microsoft Corporation, Redmond, WA, USA), and was programmed to only accept entries within pre-defined constraints. Data were retrieved using Microsoft Access 2003 (Microsoft Corporation, Redmond, WA, USA).

3.6.5 Ethical approval

The study was approved by the Nepal Health Research Council and the ethics committee of the Institute of Child Health and Great Ormond Street Hospital for Children. Analyses conducted within the study's framework fell within this ethical provision. Participant confidentiality was ensured through the coding of mothers and infants to unique identification numbers, and removal of name data.

3.7 STATISTICAL ANALYSIS METHODOLOGY – OUTCOME AND EXPOSURE DEFINITIONS

3.7.1 Outcome definitions

Neonatal death. Neonatal death was defined as an infant reported to have been born alive, who died within 28 days of birth. Stillbirths were defined as an infant born dead at 28 weeks gestation or greater, based on maternally reported suspected stillbirth and whether the infant cried, moved or breathed after birth. Deaths occurring in the first 24 hours postpartum were described as deaths in the first day ('day 1'), deaths 25-48 hours postpartum were described as deaths in the second day ('day 2'), and so on. Neonatal deaths were further classified by whether they were infection-specific neonatal deaths, based on categorisations of verbal autopsy data, as described in Sections 3.3 and 3.6.

Suspected acute respiratory infection. A composite secondary outcome variable, "suspected ARI", was constructed according to whether any of the following criteria of maternally reported morbidity indicators for the neonatal period were present: if the infant exhibited fast breathing for more than six hours; or if the infant had chest recession; or if there was grunting, gasping or nostril flaring associated with breathing. These criteria were based upon previously used signs for identification of ARI by trained field workers[311], which included fast breathing, chest indrawing or stridor at rest as indicators of moderate to severe ARI in infants under two months of age. This composite outcome variable was intended as an approximate indicator of suspected ARI, as direct observation of the infant by a physician was not conducted as part of the study surveillance, and precise thresholds including fast breathing at ≥60 breaths per minute could not be ascertained.

Suspected diarrhoea was not included as an outcome measure in the study, because maternal responses to questions on frequency of liquid stools were considered to lack specificity.

3.7.2 Exposure definitions

Any breastfeeding. An infant was considered to have been breastfed if the mother reported that she had ever breastfed her infant in the neonatal period.

Colostrum discarding. A primary comparison measure of the study was whether a mother discarded breastmilk before feeding her infant for the first time (also termed 'discarding of first milk' and 'colostrum discarding' throughout the thesis). This was ascertained based on her response to a closed binary questionnaire item asking if she squeezed and threw breastmilk before breastfeeding her infant for the first time. The wording of this item differed slightly between MIRA Makwanpur's Phase I and Phase II questionnaires; however the question was similar enough for responses in the two periods to be considered directly equivalent. The literal translation from Phase I was "before feeding the baby for the first time, did you squeeze and throw the milk?" whereas Phase II was translated as "before feeding the baby for the first time, did you squeeze and throw the *bigouti* (colostrum) milk?" The wording of this item was the same in Dhanusha as it was for Phase II of Makwanpur.

Breastfeeding initiation time was ascertained through potential responses in minutes, hours or days. For comparability with previous studies[138,160], 'early breastfeeding initiation' was defined as initiation within 24 hours postpartum (≤24 hours) and 'late breastfeeding initiation' was defined as starting breastfeeding after 24 hours. Newborn infants were further categorised by whether they initiated within the first hour, within the first 24 hours but after the first hour, from 24 to 47 hours inclusive (day two), from 48 to 71 hours inclusive (day three), or after day three.

Prelacteal feeding. An infant was categorised as having received a prelacteal feed if the first food given to the infant was reported to be any solid or liquid other than breastmilk. Mothers were asked if they had provided specific items as the first food or fluid given to the infant, including: cow or buffalo's milk, goat's milk, formula, tea or herbal water, rice pudding, *ghee* (clarified butter), fruit juice, medicine or rehydration fluids, sugar, honey or oil, with a further option of an open response for any other potential prelacteal. Not all of the above responses were available in the Makwanpur surveillance.

Established breastfeeding pattern. 'Exclusive breastfeeding' was defined if the mother reported that she was only feeding mother's milk and not feeding solids or fluids other than breastmilk at the time of taking the questionnaire. 'Non-exclusive breastfeeding' was defined if the mother reported that she was feeding solids or fluids other than breastmilk at the time of taking the questionnaire (or prior to death in instances of mortality). For Makwanpur, this was within no specific timeframe of reference, but for Dhanusha mothers were asked if they fed anything other than breastmilk in the previous week (and also in the previous 24 hours). This definition indicates whether exclusive breastfeeding was practised at the time of interview, and not necessarily since birth. The questionnaire item was binary, with closed positive or negative potential responses as to whether the mother was exclusively breastfeeding or not. No distinction was possible between predominant and partial breastfeeding.

3.8 STATISTICAL ANALYSIS METHODOLOGY – DISCARDING OF FIRST MILK AND NEONATAL MORTALITY

In this section I describe the analysis methodology used to address primary objectives: to examine the association between maternally reported discarding of first breastmilk and neonatal mortality in Makwanpur and Dhanusha. The statistical methods described below were applied to datasets from both districts. In the following section I describe analysis methodologies related to the secondary objectives.

3.8.1 Primary comparison

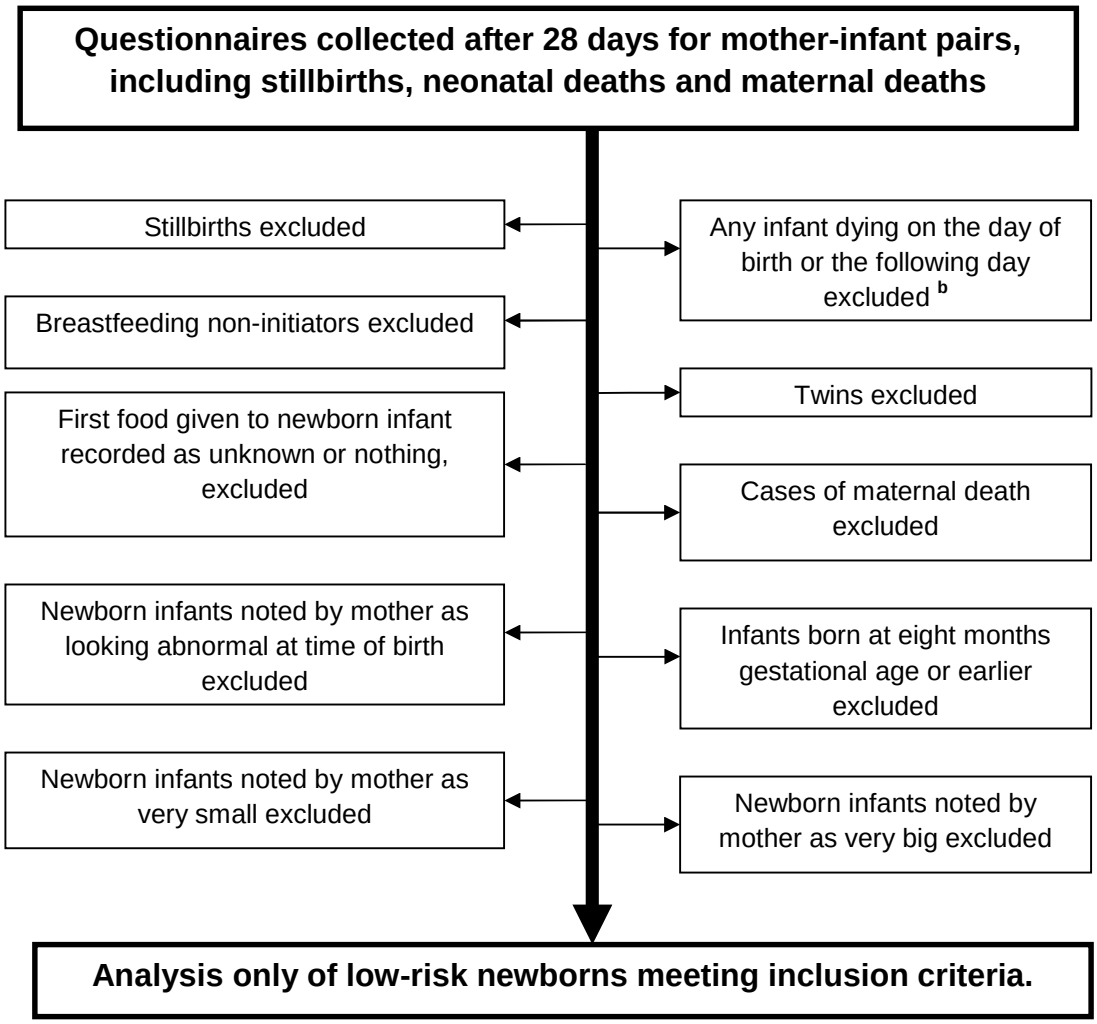
Analysis was conducted of the association between maternally reported discarding of first breastmilk and neonatal mortality. The outcome was expressed as deaths per 1000 singleton live births of ever-breastfed infants born at term and surviving 48 hours.

3.8.2 Limitation of reverse causality

In order to limit the influence of reverse causality, a number of case exclusion criteria were adopted before analysis. The primary outcome was neonatal mortality occurring after 48 hours; neonatal deaths in the first two days of life were excluded from analysis. To further reduce the potential effect of reverse causality, infants were only included in the analysis if they initiated breastfeeding, if they were perceived by the mother to have had a normal birth size, and if they were born without visible abnormalities. Multiple births, premature births (eight months gestation or less), and the infants of mothers who died postpartum were also

excluded. Cases of stillbirth were excluded. As a result of the exclusion criteria, the analysis considered a low-risk neonatal population and was conservative in its capacity to display significant associations. The exclusion criteria are represented graphically in figure 3.5. The primary analysis, as described below, was repeated with the exclusion of all early neonatal deaths (days 1-7), not only those occurring within the first 48 hours postpartum, to further limit the potential effect of reverse causality.

Figure 3.5: Limiting reverse causality: Profile of infant exclusion criteria for analysis, Makwanpur and Dhanusha [a]



[a] One infant can simultaneously meet several exclusion criteria.

[b] Primary analysis repeated with exclusion of all early neonatal deaths (days 1-7)

3.8.3 Exclusion of preterm births

Chapter 1 mentioned that the composition of early breastmilk produced for premature infants differs from that for infants born at term[244-246], and premature infants face increased mortality risk[247]. The influence of colostrum discarding on neonatal mortality may be different amongst premature infants, and ability to breastfeed may be affected in infants born at less than 33-34 weeks gestation[312]. Restricting analysis only to term infants allows description of the early infant feeding dynamics of a more homogenous group. It also limits the influence of prematurity as a confounding factor in the relationship between first milk discarding and neonatal mortality.

3.8.4 Logistic regression models and confounding variables

VDC-level clustering was accounted for with random effects models with a logit link function, after testing for whether between-VDC variance in neonatal mortality was non-zero. Accuracy of quadrature approximation was checked. Unadjusted and adjusted odds ratios were calculated for neonatal mortality risk associated with colostrum discarding, presented with 95% confidence intervals, and the relationship between colostrum discarding and neonatal mortality was cross-tabulated.

Potential confounding covariates were explored in a series of univariate binary logistic regression models, including only colostrum discarding and one other potential confounding covariate as independent variables in each instance, with neonatal mortality as the outcome measure. Variables were included in final models based upon (i) consideration of whether data on a given potential confounder were available and deemed reliable, (ii) whether the variable was suggestively associated with the exposure or the outcome in univariable analysis ($p<0.10$), (iii) whether temporally the variable could logically be considered as a confounder, (iv) whether the variable had been controlled for as a potential confounder in previous similar

studies[138,160], (v) whether intuitively a given variable was likely to be a potential confounder, (vi) whether that variable did not form an intermediate step in a causal chain between exposure and outcome, (vii) whether colinearity was exhibited between pairs of potential confounders, in which case only one was retained in models (e.g. education grade and literacy, with the simpler of the two variables retained). Higher level interaction terms between variables were also explored for association with exposure and outcome, but none were found to be significant as potential confounders.

The following covariates were included as potential confounders in all adjusted models presented: exposure to the women's group intervention, household religion, season of birth, maternal literacy, maternal age, primiparity, previous neonatal death, number of antenatal care visits, home birth, skilled birth attendance, infant sex, date of birth, exclusive breastfeeding, and a socioeconomic status proxy generated via the use of principal components analysis of asset ownership data[313], described in further detail below. In addition, in Dhanusha, exposure to the FCHV training intervention and a Pahadi/Madeshi caste variable were controlled for.

In total, five adjusted models were generated: **(i)** one including only the above potential confounding variables; **(ii)** one with the addition of prelacteal feeding as a potential confounding covariate; **(iii)** one with breastfeeding initiation time as an additional potential confounding covariate (but not prelacteal feeding); **(iv)** and one model with both prelacteal feeding and breastfeeding initiation time included in addition to the above listed variables. Likelihood-ratio tests were performed to compare the fit of models with and without the additional covariates. This was done in order to progressively explore the impact of colostrum discarding in the additional context of prelacteal feeding and breastfeeding initiation time. **(v)** A further fifth model was fitted as for *(iv)*, except with the omission of colostrum discarding as a variable, and a likelihood-ratio test was conducted [nesting model *(v)* within *(iv)*] to test whether the presence of colostrum discarding as a variable improved model fit in the context of the covariates described for model *(iv)*.

Date of birth was selected as a covariate to account for potential secular improvements in neonatal mortality and newborn care practices over the study

period. Household religion exhibited strong colinearity with ethnicity, so ethnicity was not adjusted for in the models. Adjustment was also not made for birth weight because its measurement was not recorded as part of the study surveillance. Instead, infants described by mothers as very small or very large were excluded from analysis as detailed above, one of the effects being to minimise the extent to which birth weight could act as a confounding factor. Validation of a mother's perception of birth size has been conducted elsewhere, indicating that maternal reports of an infant as "tiny" or "smaller than average" had a sensitivity of 80% and specificity of 95% in detecting a birth weight of less than 2 kg[160]. Maternal perception of birth size may therefore be considered to serve as a reasonable proxy for actual birth size. In practice, many low birth weight infants are classified as such due to prematurity, and their exclusion further helps to reduce reverse causality and to limit the study to infants born at term who display more homogenous patterns of early infant feeding and mortality risk.

Analysis was conducted in Intercooled Stata version 11.1 (Stata Corporation, College Station TX, USA, 2010) and cross-checked in MLwiN version 2.20 (Centre for Multilevel Modelling, University of Bristol, UK, 2010). Data preparation and preliminary exploration using binary logistic regression models was conducted in PASW Statistics version 18.0.1 (SPSS Inc., Chicago IL, USA, 2009). Results were expressed graphically with Kaplan-Meier survival curves.

3.8.5 Treatment of missing data

Missing data were replaced with mean values of relevant variables. In addition, for any variable with missing values, an associated binary variable was generated to indicate for each case whether a data point was missing in the original variable. For example, if the datum on maternal age was missing for a given case, not only would the missing value be replaced by mean age, but a value of 1 was assigned to a newly created variable for missing data. Values of 0 were assigned if data were not missing. These additional 'missingness' variables were explored for association with neonatal mortality and early infant feeding practices in order to ascertain if missing data were Missing at Random (MAR) relative to exposure and outcome variables. Missingness was not found to be significantly associated in any instance, and replacement with mean values was not deemed to introduce this specific form of bias into analysis.

Of the primary outcome variables in the thesis, there were no instances of missing data for neonatal mortality. In instances of neonatal death, verbal autopsies were collected as part of the MIRA surveillance systems both in Makwanpur and Dhanusha, and the existence of verbal autopsy data for an infant was used by the researcher to indicate whether an infant had died. The compound secondary outcome, suspected acute respiratory infection, also did not demonstrate any instances of missing data in either site. This was in part due to the fact that multiple indicators contributed to the suspected ARI variable, so that missingness in one indicator in a given case did not mean that a value for suspected ARI could not still be derived.

Of the key exposure data, after application of the analysis exclusion criteria, there were no instances of missing data for colostrum discarding in Makwanpur or Dhanusha. Similarly, both in Makwanpur and Dhanusha, after application of the exclusion criteria, there were no instances of missing data for breastfeeding initiation time and the food that was first given to the infant (used to derive whether any prelacteal feed was given). Instances of missing data in these variables prior to the exclusion criteria were accounted for by mothers who failed to initiate

breastfeeding (488 cases in Makwanpur, 364 cases in Dhanusha). In analyses displayed in the thesis, missing data for these key exposure variables had no influence on the results or conclusions drawn. The completeness of the dataset, however, raises its own issues, in that it implies that all participants provided answers even when they may have been unsure of what category they fell in (for example, for the timeframe that breastfeeding was initiated within).

For exclusive breastfeeding, there were also no instances of missing data in Makwanpur after application of the exclusion criteria. However, in Dhanusha there were 139 cases where no data was recorded for what was fed to the infant in the last 24 or last seven days. As is shown in Table 6.14, there were 3402 singletons born at term who initiated breastfeeding, survived 48 hours, and whose mothers were interviewed between four and five weeks postpartum, who were included in analysis. Within this population, 24 cases lacked data on what was fed to the infant in the last seven days. For these cases, the missing values were replaced with the mean of a derived binary variable 'infant was exclusively breastfed' (for which the only possible values were 1 and 0). While mean substitution does lead to an underestimate of standard error, and adds no new information to an analysis, the few instances where it was necessary in this context are unlikely to have influenced the overall result or conclusion.

For the risk factor analyses of predictors of colostrum discarding described in sections 5.3.6 and 6.3.6, cases where colostrum discarding data were absent (i.e. where mothers failed to initiate breastfeeding) were excluded through listwise deletion in analysis. Instances of missing data in potential confounding variables have been indicated in Tables 5.4 and 6.4. These points were replaced by means for each variable. While mean substitution influences standard error estimates, the overall results and conclusions are unlikely to have been affected substantially.

3.8.6 Principal Components Analysis

Principal components analysis (PCA) scoring of asset ownership data provides a strong proxy for household wealth where income or expenditure data are not available or appropriate[314,315]. This is relevant in Nepal where wealth is not necessarily reflected by financial expenditure data, particularly in subsistence agricultural communities where forms of exchange other than financial ones may play a significant economic role. The data collected by MIRA Makwanpur in Phases I and II of the women's groups trial, and by MIRA Dhanusha, included a number of questions on household ownership of assets and related information, such as ownership of a bicycle or building material of the home. This information was useful in the context of the thesis because socioeconomic status (SES) is an important potential confounding variable to control for.

PCA scoring of asset ownership data, Dhanusha[*]. For Dhanusha, PCA of selected asset ownership data produced a proxy score for SES, derived from the first principal component of the analysis. Scores produced were checked for internal and external coherence (for example, wealthier households tended to own more land, and wealthier mothers tended to have studied to a higher grade). The PCA score was subsequently included as a potential confounding factor in multivariable analyses presented. Individual scores were used, and not rank by quintile, due to concerns of loss of information in categorisation, after testing for assumptions of normality in the original PCA scores.

The original asset data contributing to the PCA wealth score were not included in multivariable models presented in the thesis because the number of additional terms raised concerns of overfitting.

[*] Contrary to the usual order in which information has been presented in this chapter, the method used for PCA scoring of asset ownership data appears for Dhanusha first because it was the simpler of the two sites. The method employed in the case of Makwanpur embellishes upon what is described first for Dhanusha.

PCA scoring of asset ownership data, Makwanpur. A similar process was employed with asset ownership data from Makwanpur as detailed above for Dhanusha. However, the data collected by MIRA Makwanpur included comparable but not identical questions on asset ownership in Phases I and II. Relatively few asset variables were directly comparable between the two phases. In order to construct one consistent variable reliably indicating household wealth for cases across the merged dataset of Makwanpur's Phase I and Phase II data, PCA scoring was conducted separately for asset data from each phase – scores were then treated as one consistent variable across the entire merged dataset from Phases I and II, used to control for SES as a potential confounding factor.

A justification for this procedure was that PCA produces scores with relative values, in this instance based on a household's wealth relative to the sample within which it is found. Poorer households receive negative scores, wealthier households receive positive scores, and the mean score is 0. A household falling in, for example, the wealthiest 20% of the population should receive approximately the same score across phases, regardless of the precise asset information asked in each phase, as long as available asset data allow reliable estimation of socioeconomic status in both phases. Even though the precise asset information collected from Phases I and II differed somewhat, the proxy scores generated in each instance are directly comparable along one scale, and so were treated as a single variable for the purposes of controlling for SES as a potential confounding variable when merging data from Phases I and II.

Validation of this procedure was possible. 3300 mothers contributed data both in Phases I and II through multiple births, and their repeated scores could be compared for consistency. Assuming that, on average, households maintained the same relative wealth rank in Phases I and II, with few exceptions, and that the six additional VDCs included in Phase II were not markedly poorer or wealthier than the 24 VDCs of Phase I, scores for mothers appearing in both phases should remain comparable. All cases were ranked to quintiles according to their PCA score. Mothers appearing in both Phases I and II were ranked (at least) twice, once for each score generated separately from each phase. Quintile assignment of these mothers was compared, with crosstabulation of groupings in Phase I against Phase

II. Table 3.3 indicates the proportion of households scoring within the same wealth band in both phases.

Table 3.3: Validation of repeated principal components analysis scoring of socioeconomic status in Phases I and II: Number (and % of total) of mothers ranked to wealth quintiles at least once in each Phase, by combination of first and second ranking (n=3300) [a, b, c, d, e, f]

		Phase II wealth quintile					
		1	**2**	**3**	**4**	**5**	
Phase I wealth quintile	**1**	**527 (16)**	102 (3)	87 (3)	48 (1)	15 (0)	
	2	115 (3)	**439 (13)**	98 (3)	86 (3)	39 (1)	
	3	70 (2)	106 (3)	**386 (12)**	91 (3)	45 (1)	
	4	40 (1)	75 (2)	80 (2)	**357 (11)**	41 (1)	
	5	19 (1)	33 (1)	57 (2)	45 (1)	**299 (9)**	
					Total cases ranked to same quintile in both phases:		**2008 (61)**

[a] A total of 3300 mothers received questionnaires both in Phases I and II.

[b] Values are *n* (% of total) - i.e. the 25 cells in the table sum to 3300 (100) not including the extreme bottom-right 'total' cell. Individual rows and columns do not add to 100.

[c] Mothers ranked in quintile 1 represent the least wealthy 20% of the sample, those ranked in quintile 5 represent the wealthiest 20% of the sample, intermediate ranks represent intermediate fifths by wealth.

[d] Cells in bold (along the diagonal) indicate cases that were ranked to the same quintile in both Phases. The extreme bottom-right cell indicates the sum (and %) of all cases ranked to the same quintile in both Phases, i.e. 527 + 439 + 386 + 357 + 299 = 2008

[e] Where mothers gave birth to more than one child during a single phase, the first birth was selected.

[f] A detail to note is that lower quintiles are more represented in Table 3.3. This may be because poorer mothers in Makwanpur have greater fertility rates and so are more likely to experience multiple births within the study period.

Table 3.3 indicates that 61% of households measured in both Phases I and II were ranked in the same wealth quintile in both phases, and a further 21% were ranked differently by only one quintile.

The unification of PCA scores, derived from different asset data, onto one scale appears to offer a reasonably consistent proxy for wealth, sufficient at least for use as a variable to control for potential confounding due to SES.

3.8.7 Population attributable risk

In the context of the thesis, population attributable risk (PAR) estimates the proportion of neonatal deaths attributable to discarding first breastmilk, or, inversely, the proportion of neonatal deaths that would be avoided if all mothers did not discard their first breastmilk. Odds ratios approximate relative risk for outcomes that occur infrequently (nominally less than 10%), and for the purposes of calculating PAR here they are treated as equivalent. The following formula (Equation 3.1) was used to calculate PAR[316].

Equation 3.1: Population attributable risk

$$PAR\% = 100 \times \frac{RR-1}{RR} \times \frac{\text{Deaths in exposed group}}{\text{Overall number of deaths}} \qquad \textit{(Equation 3.1)}$$

Where: PAR = Population Attributable Risk

RR = Relative Risk

Relative risk estimates were based on the adjusted odds ratio generated from the model that included prelacteal feeding and breastfeeding initiation time as covariates (model *iv* above). PAR was calculated twice. The first calculation was made for the set of neonatal deaths remaining after the application of the above exclusion criteria (i.e. deaths on the day of birth or the following day were excluded). A second calculation was made for the set of neonatal deaths including those in the first two days after birth, twins, and preterm births, on the assumption that these additional deaths were not influenced by colostrum discarding. The second calculation allowed estimation of the proportion of avoidable neonatal deaths attributable to colostrum discarding in the general context of all neonatal deaths.

3.9 STATISTICAL ANALYSIS METHODOLOGY – ADDRESSING SECONDARY OBJECTIVES

In this section I describe the statistical analyses conducted to address several secondary objectives of the thesis, using quantitative data from both Makwanpur and Dhanusha. The relevant secondary objectives addressed were to: (i) examine any association between discarding of first milk and suspected acute respiratory infection (ARI); (ii) analyse risk of infection-specific neonatal mortality by first milk discarding status, based on categorisation derived from verbal autopsy data; (iii) clarify any relationship between prelacteal feeding and neonatal mortality; (iv) replicate previous analyses of breastfeeding initiation time and neonatal mortality; (v) replicate previous analyses of established breastfeeding patterns (exclusive and non-exclusive breastfeeding) and neonatal mortality; and (vi) explore characteristics predicting the discarding of first milk as a risk-factor analysis.

3.9.1 Discarding of first milk and suspected acute respiratory infection

Analysis was conducted of the association between maternally reported discarding of first breastmilk with suspected ARI. This was done to elucidate the potential impact of colostrum discarding on neonatal morbidity due to ARI, and to explore ARI as a potential pathway through which neonatal mortality may be affected. The outcome definition has been described above in Section 3.7, and produced a binary composite variable based on maternally reported observation of fast breathing, or chest recession, grunting, gasping or nostril flaring in the infant. The outcome was expressed as cases of neonatal suspected ARI per 1000 singleton live births of ever-breastfed infants born at term and surviving to day 2. Reverse causality was limited through the same exclusion criteria as described for the primary analysis in Section 3.8, as risk of ARI in the first two days of life was assumed to not be influenced by early infant feeding practices. Preterm infants and those suspected to be small or large at birth were also excluded.

VDC-level clustering was accounted for with random effects logistic regression models. Crude and adjusted odds ratios were calculated for suspected ARI risk associated with colostrum discarding, presented with 95% confidence intervals, and the relationship between colostrum discarding and suspected ARI was cross-tabulated. The same potential confounding covariates were included in all adjusted models as described in Section 3.8, to facilitate direct comparability between models describing neonatal mortality and suspected ARI as outcomes. A total of four adjusted models are presented in addition to crude odds ratios: one with only the *a priori* selected covariates as described, one with the addition of breastfeeding initiation time as a term, one with prelacteal feeding added as a term, and one with both prelacteal feeding and breastfeeding initiation time included in the model. Likelihood ratio tests were performed to compare the fit of models with and without the additional covariates present. PAR was estimated for the proportion of cases of suspected neonatal ARI attributable to discarding colostrum amongst the analysed low-risk group of singletons born at term who initiated breastfeeding and survived 48 hours.

3.9.2 Discarding of first milk and infection-specific neonatal mortality

Analysis of the association between maternally reported discarding of first breastmilk with neonatal death attributable to severe infection was conducted. This was done to elucidate the potential impact of colostrum discarding on neonatal mortality due to infectious causes, and to explore the importance of infection as a major way in which all-cause neonatal mortality may be affected by colostrum discarding. Cause of neonatal death was ascertained from verbal autopsy data as described above, with 'severe infection' as potential categories across both Makwanpur and Dhanusha study sites. The outcome was expressed as neonatal deaths attributable to severe infection per 1000 singleton live births of ever-breastfed infants surviving to day 2 and born at term. Reverse causality was limited through the same exclusion criteria as described for the primary analysis in Section 3.8, as risk of infection in the first two days of life was assumed to not be influenced by early infant feeding practices. Preterm infants and those suspected to be small or large at birth were also excluded.

VDC-level clustering was accounted for with random effects logistic regression models. Crude and adjusted odds ratios were calculated, presented with 95% confidence intervals. Cross-tabulation was made of the relationship between colostrum discarding and infection-specific neonatal mortality. The same potential confounding covariates were included in all adjusted models as described in Section 3.8, to facilitate direct comparability between models describing all-cause neonatal mortality and infection-specific neonatal mortality as outcomes. A total of four adjusted models were presented in addition to crude odds ratios: one with only the *a priori* selected covariates as described, one with the addition of breastfeeding initiation time as a term, one with prelacteal feeding added as a term, and one with both prelacteal feeding and breastfeeding initiation time included in the model. Likelihood ratio tests were performed to compare the fit of models with and without the additional covariates present.

Cause of death data was available for the entire Dhanusha trial period to date, and for the whole of the Makwanpur Phase I trial period. However, for Makwanpur

Phase II, cause of death categorisation was only available for questionnaires collected between September 1 2006 and November 30 2007.

Comparable analysis was attempted for hypothermia-specific neonatal mortality as an outcome of interest, but there were too few cases of neonatal mortality attributable to hypothermia amongst infants surviving more than 48 hours in both Makwanpur and Dhanusha study samples for such analysis to be possible.

3.9.3 Addressing secondary objectives (iii), (iv) and (v): prelacteal feeding, breastfeeding initiation time, exclusive breastfeeding, and all-cause neonatal mortality

As indicated in Section 1.3 and Appendix A, existing evidence relating prelacteal feeding and neonatal mortality is inconclusive, evidence relating breastfeeding initiation time and neonatal mortality is emerging, and evidence on exclusive breastfeeding has more often focused on the infant period as opposed to the neonatal period. Data from the MIRA Makwanpur and Dhanusha surveillance systems afforded the opportunity to attempt replication of previous analyses investigating the impact of prelacteal feeding, breastfeeding initiation time, and exclusive breastfeeding on neonatal mortality.

Because of close similarities in the methods used, three sets of analyses are described in tandem in this sub-section: analysis of the association between maternally reported prelacteal feeding and all-cause neonatal mortality, analysis of the association between breastfeeding initiation time and all-cause neonatal mortality, and analysis of the association between maternally reported exclusive or non-exclusive established breastfeeding at one month post-partum with all-cause neonatal mortality.

In all of these analyses, the outcome was expressed as deaths per 1000 singleton live births of ever-breastfed infants surviving to day 2 and born at term. Reverse causality was limited through the same exclusion criteria as described for the primary analysis in Section 3.8. Preterm infants and those suspected to be small or large at birth were also excluded.

The exposure variables were categorised as follows. Prelacteal feeding was treated as a binary variable, defined above in Section 3.7. Newborn infants were categorised as 'early' or 'late' initiators (starting breastfeeding within 24 hours and after 24 hours respectively), and further categorised by whether they initiated within the first hour, within the first 24 hours but after the first hour, from 24 to 47 hours inclusive (day two), from 48 to 71 hours inclusive (day three), or after day three. Initiation within one hour was adopted as the reference category. Exclusive breastfeeding was treated as a binary exposure variable, defined above in Section 3.7. The variable was treated only as binary because the source questionnaire item was binary, with closed positive or negative potential responses as to whether the mother was exclusively breastfeeding or not. No distinction was possible between predominant and partial breastfeeding.

For all analyses, VDC-level clustering was accounted for with random effects logistic regression models. Crude and adjusted odds ratios were calculated for neonatal mortality risk associated with prelacteal feeding, presented with 95% confidence intervals. Crude and adjusted odds ratios were also calculated for neonatal mortality risk associated with the different categories of breastfeeding initiation time, presented with 95% confidence intervals, and the equivalent information was also calculated for neonatal mortality risk associated with exclusive breastfeeding. The relationship between prelacteal feeding and neonatal mortality was cross-tabulated, as were the relationships between breastfeeding initiation time and neonatal mortality, and established breastfeeding pattern and neonatal mortality.

For the association of prelacteal feeding and all-cause neonatal mortality, and breastfeeding initiation time and all-cause neonatal mortality, the same initial set of covariates as detailed in Section 3.8 were included as potential confounders in all the adjusted models presented. In a similar fashion to other analyses in the thesis, a

total of four adjusted models were presented for each of the two associations examined: one with only the *a priori* selected covariates as described above, one with colostrum discarding added as a term, one with either breastfeeding initiation time or prelacteal feeding added (addressing objectives ii and iii respectively), and one with both colostrum discarding and the other additional term included in the model (either breastfeeding initiation time or prelacteal feeding, depending on the exposure of interest). Likelihood ratio tests were performed to compare the fit of models with and without the additional covariates present. Where breastfeeding initiation time was categorised by initiation within the first hour, within the first 24 hours but after the first hour, from 24 to 47 hours inclusive (day two), from 48 to 71 hours inclusive (day three), or after day three, the existence of a dose-response trend was tested using the Mantel-Haenszel test for trend.

For the analysis of exclusive breastfeeding and all-cause neonatal mortality, only one adjusted model was presented. The following covariates were included as potential confounders in the adjusted model presented: exposure to the women's groups intervention, household religion, season, maternal literacy, maternal age, primiparity, previous neonatal death, number of antenatal care visits, home birth, skilled birth attendance, infant sex, date of birth, a socioeconomic status proxy generated via the use of principal components analysis of asset ownership data, colostrum discarding, prelacteal feeding, and breastfeeding initiation time. Only the one model was presented because the researcher was interested in the effect of exclusive breastfeeding in the context of colostrum discarding, prelacteal feeding and breastfeeding initiation time as covariates in a model, and it was not deemed necessary to disambiguate the effect of incrementally introducing these variables as terms in separate models.

3.9.4 Risk factor analysis of covariates predicting colostrum discarding

Risk factors for the reported discarding of colostrum were explored for both the Makwanpur and Dhanusha datasets, treating colostrum discarding as a binary outcome variable of interest. Potentially significant predictors were first identified with a series of univariable logistic regression analyses. In these initial models, factors were considered to be of potential importance if the two-sided p-value was less than 0.10. Of factors identified in this way, two-way interaction effects between the terms were also explored for significance in univariable analyses.

After testing for whether between-VDC variance in reported colostrum discarding was non-zero, multivariable random effects logistic regression modelling was used, including all variables identified as potentially important by the univariable analyses. Factors were considered to be significant at this stage if the two-tailed p-value was less than 0.05. Where applicable, the increase in risk of colostrum discarding for a unit increase in a given significant factor was described.

No exclusion criteria were applied to the dataset for this analysis, although only infants who initiated breastfeeding were considered because no colostrum discarding information was available for non-initiators. Potential risk factors were only considered if logically and temporally they might be related causally to colostrum discarding behaviour, proximally or distally. Gestational age, multiparity and maternally reported birth weight were treated as potentially confounding covariates in the same fashion as other variables.

CHAPTER 4: MAKWANPUR QUALITATIVE METHODOLOGY

As described in the previous chapter, quantitative exploration of the impact on neonatal outcomes of discarding colostrum before establishment of breastfeeding in Makwanpur district forms a major component of the thesis investigation, as does analysis of risk factors predicting colostrum discarding.

However, consideration of this form of data alone has limitations. The questionnaires collected by MIRA Makwanpur (and MIRA Dhanusha) only allowed mothers to provide a closed positive or negative response when asked if they discarded their breastmilk before initiating breastfeeding. Closed binary responses of this nature hide any potential detail of the range of behaviours that may constitute colostrum discarding, and do not examine reasons for why mothers may discard their first milk. Discarding colostrum may quantitatively be shown to increase risk of neonatal mortality and morbidity measures, but potential interpretation of such results is limited without more in-depth description of what mothers may do with their first breastmilk, the reasons and beliefs underlying their practices, and identification of how potential behaviours practised by mothers are in turn categorised in a closed binary questionnaire format.

Two needs have therefore been highlighted:

1. To describe behaviours and beliefs that may exist amongst mothers in Makwanpur district regarding the discarding of first breastmilk before initiation of breastfeeding.

2. To identify which behaviours were classified as "yes" or "no" when mothers were asked in questionnaires if they discarded their first breastmilk before initiating breastfeeding.

In this chapter I describe the qualitative methods used to explore these issues, including the sampling method, data collection methods and training of the research assistant interviewer, the theoretical basis of the data collection methods, analysis and synthesis of data, ethical considerations, and steps taken to promote the trustworthiness of the data produced. Analysis and interpretation of the qualitative data generated is presented in Chapter 7.

Qualitative data were collected through 15 semistructured interviews with recent mothers, four focus group discussions with recent mothers, five semistructured interviews with MIRA Makwanpur field staff who had collected the original surveillance data from participants, and two semistructured interviews with hospital nurse midwives. Interviews and subsequent transcription and translation to English were conducted by an educated female Nepali research assistant specifically employed and trained in situ for the role. Data sources were triangulated using a grounded theory approach.

4.1 RESEARCH OBJECTIVES AND CONCEPTUAL FRAMEWORK OF THE QUALITATIVE INVESTIGATION

4.1.1 Objectives

There were two objectives behind the qualitative research component of the thesis investigation, the aim being to explain the social processes behind the decision to discard first breastmilk:

1. To explore behaviours and beliefs amongst mothers in Makwanpur district regarding the discarding of colostrum before initiation of breastfeeding. This was a primary objective detailed in Section 1.8.

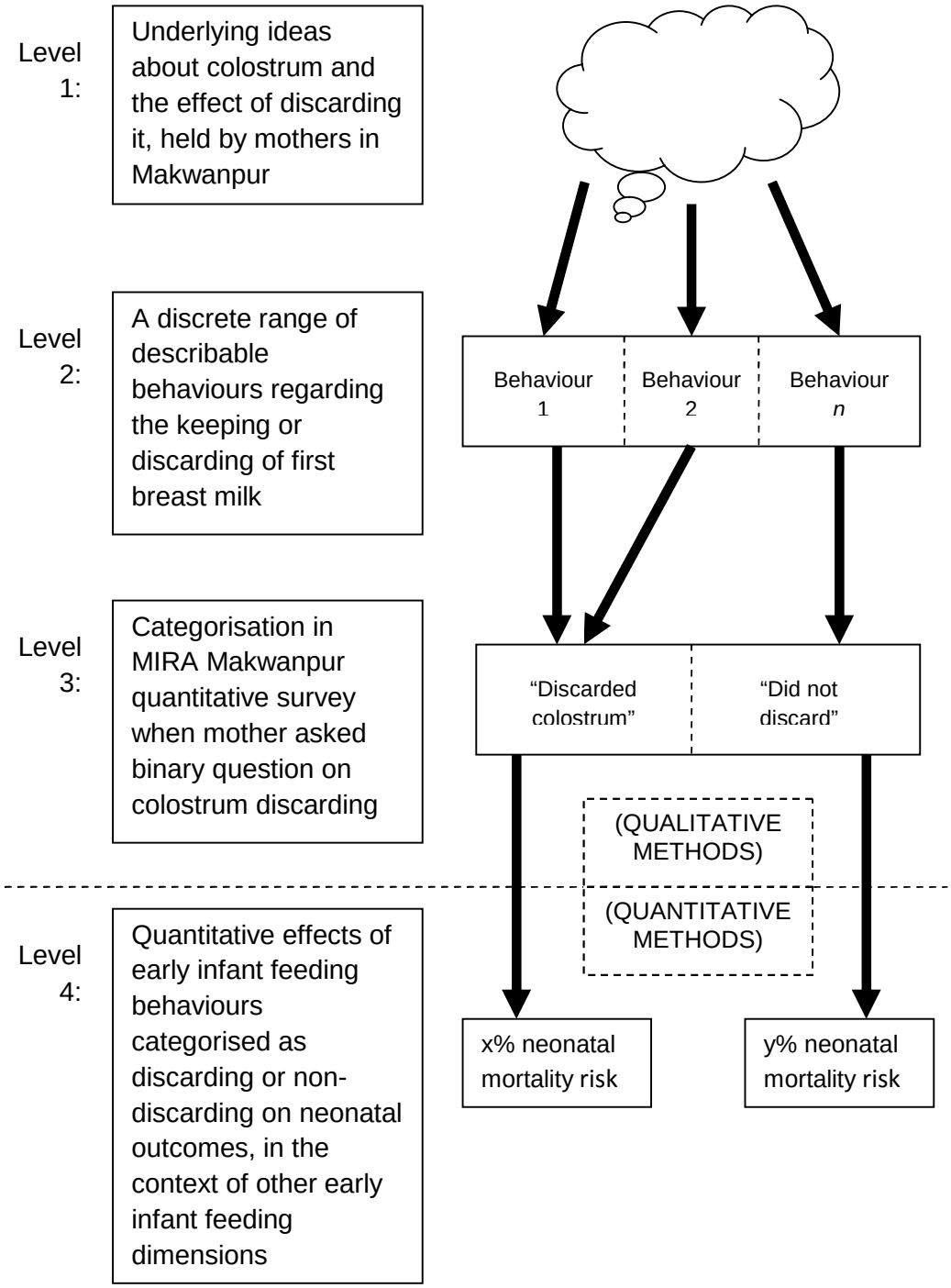
2. To identify which behaviours may have been classified as ‘yes’ or ‘no’ responses when mothers were asked the question “before feeding the baby for the first time, did you squeeze and throw the milk?” This was a secondary objective detailed in Section 1.8.

4.1.2 Conceptual framework

A starting framework with which the objectives were conceptualised is shown in figure 4.1. It was hypothesised that there may be an absolute range of behaviours, and that a range of underlying beliefs may explain mothers' early infant feeding decisions. Several examples of negative perceptions of colostrum in south Asia were described in Section 1.4 of the thesis, which may or may not be relevant in the context of Makwanpur district.

It was in turn assumed that some behaviours may tend to be categorised in one way or the other when mothers were asked "before feeding the baby for the first time, did you squeeze and throw the milk?" as a quantitative survey question – potentially depending on how the question was interpreted by mothers, as well as on how potential responses were in turn classified by survey field interviewers. If discarding of colostrum is found through quantitative methods to be a risk factor for neonatal mortality, it becomes crucial to describe what behaviours may constitute a binary classification of colostrum discarding, and what may explain them.

Figure 4.1: Starting conceptual framework of the qualitative investigation, and its relationship with the quantitative investigation



4.1.3 Use of grounded theory

Grounded theory was developed by Glaser and Strauss[317]. A key property is its ability to generate theories on social phenomena, grounded in systematic analysis and triangulation of data. Its use is appropriate when the study of social experiences aims to explain a process[318], making it relevant for addressing the qualitative questions of the thesis investigation. While grounded theory is not appropriate for testing or verifying existing hypotheses, researchers frequently approach a question with background assumptions or concepts after gaining acquaintance with the topic, in this instance represented by figure 4.1. Key features of grounded theory include (i) an iterative study design, whereby analysis informs further data collection, (ii) purposive sampling, whereby participants are intentionally chosen to encompass the range and diversity present in settings necessary to inform the development of hypotheses, and (iii) constant comparative analysis, whereby issues of note in the data are compared with other examples for similarities and differences[318].

4.1.4 A note on positivism, interpretivism and reflexivity

In the same epistemological tradition as the way in which the quantitative component of the thesis investigation was interpreted, a positivistic approach influenced much of the qualitative component of the thesis investigation. Further qualification of this point is necessary.

Positivism is often implied when exploring causal relationships, based on developing knowledge through hypothesis testing and the application of scientific methods – quantitative research emphasises a deductive, objective and generalising approach. This is in contrast with the interpretivistic (or antipositivistic) tradition that arguably predominates in qualitative research, whereby knowledge is

understood through the meaning given by participants – an inductive, subjective and contextual approach.

However, the two traditions are neither mutually exclusive nor absolute, and their relationship is potentially blurred or even symbiotic; while positivism is often implied when exploring causal relationships, discovering social causal mechanisms is served by interpretivism[319]. The mixed methods nature of the overall thesis investigation demands exploration of potential causal associations as part of the theoretical framework, while also lending importance to interpretivism when attempting to understand what perceptions of colostrum may exist amongst mothers in Makwanpur. Criteria from both paradigms are arguably integrated into the thesis.

While reflexivity is acknowledged – the fact that the researcher had an effect on the nature of the qualitative data collected and its interpretation – the researcher conducted the study with the attitude that mothers of Makwanpur are practising an objectively definable range of behaviours with regards to the keeping or discarding of first breastmilk, and it was his role to discover what that range may be while minimising the impact of his own presence on the results. Describing the underlying beliefs and perceptions of mothers towards first breastmilk is laden with additional subjectivity in interpretation, and it is here that an attitude of interpretivism was more applicable.

4.1.5 Mixed methods: Temporal sequence of methods used and their relative importance

The strategy for the mixing of quantitative and qualitative methods in the thesis is described as follows. The qualitative investigation described in this chapter was formulated and conducted after results from quantitative analysis of MIRA Makwanpur Phase I and Phase II data had been largely completed, and while preparation and analysis of MIRA Dhanusha quantitative data was ongoing. The results generated by statistical analysis of MIRA Makwanpur surveillance data, and the subsequent problems in interpreting those results without further qualification of what mothers may do with their first breastmilk and why, informed the qualitative component of the thesis study.

The qualitative component of the thesis was primarily designed to inform interpretation of results generated by the statistical analysis of the surveillance data of MIRA Makwanpur and to a lesser extent MIRA Dhanusha. The overall thesis only constitutes mixed methods in that the methods were integrated at the stage of interpretation. To a large extent, the methods described in Chapters 3 and 4 constitute stand-alone studies.

4.2 RESEARCH POPULATION AND PURPOSIVE SAMPLING STRATEGY

4.2.1 Primary research population and further data sources

There was one population to which results from the study were intended to be applicable, and two additional sources of data.

Mothers of Makwanpur. An objective of the study was to explore the behaviours and beliefs of mothers in Makwanpur district regarding the discarding of colostrum before initiation of breastfeeding, with particular reference to understanding the responses of the study population included in MIRA Makwanpur surveillance. As such, the primary qualitative study participants were selected from a population which was itself the study sample described for MIRA Makwanpur surveillance in Section 3.3: any fertile married woman aged 15 to 49 years living in the expanded 30 trial VDCs, who had given birth to at least one infant during the trial period and responded to the MIRA Makwanpur surveillance questionnaires, was of potential interest. Results produced by the study were intended to be generalisable to this population and the wider population of all fertile married women across Makwanpur district.

Study of this population also afforded the opportunity to purposively sample women based on a detailed range of characteristics already known through the MIRA Makwanpur questionnaire data collection. Existing rapport between the mothers and MIRA greatly facilitated sampling, contact and relationships conducive to conducting the study.

MIRA Makwanpur surveillance VDC Interviewers as key informants. The experiences of MIRA Makwanpur surveillance field staff who collected questionnaire data from mothers in Makwanpur were also of interest in this study, in order to

determine what responses mothers potentially gave when asked if they discarded colostrum, and to understand the basis upon which a field interviewer might categorise a response as ‘discarding’ or ‘not discarding’ colostrum.

Hetauda District Hospital midwives as key informants. In order to understand what mothers in Makwanpur do with their first breastmilk in the district hospital birth setting, semistructured interviews were conducted with midwives from Hetauda District Hospital.

Ongoing diary entry and log book keeping. All events, decisions, work progress, discussions, and editions to existing documents were logged by time and date in a log book. Issues encountered during the study, as well as information of potential interest shared outside of formal interview or focus group discussion time, was written in a diary. While not explicitly contributing data to the study, these sources influenced many aspects of the study design and interpretation.

4.2.2 Semistructured interviews with mothers: Theoretical stratified purposive sampling strategy

In practice, the population from which primary participants could potentially be sampled was limited to include only mothers who had given birth and been visited by MIRA Makwanpur surveillance interviewers within the 12 months preceding the start of qualitative data collection (births after 1 March 2008). This was to minimise the recall time following the initial questionnaire surveillance contact by MIRA Makwanpur field staff. 1018 mothers were eligible for selection as a result.

Since MIRA Makwanpur surveillance was completed on 31 December 2008 and the qualitative data collection for this study commenced in late March 2009, sampled mothers had given birth at least three months prior to qualitative follow-up, but no

more than 13 months prior (for mothers interviewed towards the end of the qualitative study). Interviews were steered to ask specifically about a mother's most recent birth.

A further sampling limitation criterion was that only mothers who had previously reported that their infant initiated breastfeeding were selected.

Using existing records from recent MIRA Makwanpur surveillance, a theoretical stratified purposive sampling method was employed[320], in order to capture a range of experiences from participants and allow comparison across several characteristics hypothesised to be of importance in determining colostrum discarding behaviour. Initially 12 participants were selected, stratified by:

- Whether they had previously reported that they had discarded colostrum (eight discarded, four did not). More mothers who had reported discarding of colostrum were selected because it was envisaged that a wider range of potential behaviours and underlying explanations might be discussed within the discarding group.
- Whether they resided in a hill or plains VDC (eight from hill VDCs, four from plains VDCS), accounting for the geographical diversity of Makwanpur.
- Ethnicity. Participants were purposively selected to ensure relatively large representation of the two major ethnic groups (Tamang, Brahmin/Chhetri) as well as gaining some representation from the next most numerous groups: Newar, Magar, Rai, Kami and Chepang. Each of these ethnic groups comprised over 4% of the study population surveyed by MIRA Makwanpur, whereas the next most numerous group comprised only 0.2%.

Participants were also selected to ensure that they included a diversity of recorded literacy levels, antenatal care attendance, women's group attendance, infant sex and birth attendance. Attention was also paid to the mother's breastfeeding initiation time and whether the mother had suffered a death of her infant; all of the study participants continued to have surviving infants at the time of qualitative follow-up.

As the study progressed, further participant selection was iterative based on the range of discussion generated by initial semistructured interviews and focus group discussion with mothers. Three further interviews were conducted because of the diversity in initial responses and continued generation of new themes observed from the initial data collected. It was also felt that an insufficient number of Tamang mothers had been interviewed to adequately represent this major ethnic group of Makwanpur, and that additional participants were required who were recorded as not discarding colostrum in the MIRA Makwanpur surveillance. After iterative sampling of further participants, the number of semistructured interviews conducted totalled 15.

The study was designed with the intention to continue iterative sampling to saturation. However, although new themes were still potentially emerging after 15 interviews, the study was discontinued at this point due to depletion of available funds, onset of monsoon season, visa expiration, and additional civil turbulence and road blocks brought on by the resignation of the Maoist prime minister during the study period.

The range of mothers sampled for interview, including those iteratively selected during the study's progression, are described according to their stratification criteria and other major characteristics in figure 4.2. No mothers declined to participate.

For each mother selected for interview, a 'reserve' interviewee was also selected from amongst neighbours, as close as possible in key characteristics to the first intended interviewee. This was done in order to reduce the risk of arriving at the village of a mother and for no data collection to be possible after a lengthy journey time. In no instances was interview of a 'reserve' participant necessary; 'first-choice' participants were contacted as intended in all instances.

Figure 4.2: Sampled participant characteristics, stratified by colostrum discarding, topography and ethnicity

Participant #	VDC, Ward (sector)	Keep milk	Discard first milk	Hill VDC	Lower VDC	Tamang	Other Ethnicity	Literacy	Received any antenatal care	Women's group attendance	Skilled birth attendance (doctor, nurse, ANM)	Baby sex
1	19, 1 (4)	✓		✓			Chhetri	High	✓		✓	G
2	19, 4	✓		✓			Newar	High	✓	✓		B
3	19, 1 (2)	✓		✓		✓		High	✓	✓	✓	B
4	20, 4 (3)	✓		✓			Brahmin	Mid	✓			B
5	13, 3	✓			✓	✓		Low	✓	✓		G
6	13, 6	✓			✓		Rai/ Danuwar	High				B
7	13, 4		✓		✓	✓		High	✓			B
8	20, 4 (1)		✓		✓	✓		Mid				G
9	1, 8		✓		✓		Newar	High	✓		✓	B
10	13, 9		✓		✓		Magar	Mid	✓	✓		B
11	18, 9		✓	✓			Kami	Mid		✓		G
12	16, 5		✓	✓		✓		High	✓			G
13	21, 9		✓	✓			Chhetri	Low	✓			B
14	14, 6		✓	✓			Brahmin	High	✓		✓	B
15	18, 2		✓	✓			Chepang	Low	✓	✓		B
	Totals:	6	9	9	6	5	10	-	12	6	4	-

4.2.3 Focus group discussions with mothers: Sampling strategy

Four focus group discussions were conducted with recent mothers, selected from the same population of potential participants as were eligible for semistructured interview. The major factors determining selection of focus group discussion invitees were (i) geographical dispersion of potential participants, and (ii) in different cases, ethnic homogeneity or birth attendance by the mother-in-law. One focus group was intended as a practice session for training purposes (described in further detail later in the chapter), but the data produced were sufficiently rich to contribute to the study.

Geographical dispersion. A key defining factor in selecting focus group discussion participants was the existence of a concentration of eligible mothers within close proximity of each other. Mothers were selected who lived within a close distance of each other in order to minimise inconvenience and travelling time for participants to reach a meeting area, to increase the proportion of invited mothers who were likely to attend, and to minimise logistical difficulty in facilitating the discussion and contacting mothers beforehand. With the aim that each focus group discussion comprised 6-12 participants, and the anticipation that up to half of invited mothers would be unable to attend, focus groups were only attempted where at least 15 mothers were considered to reside in sufficiently close proximity.

Judgement of whether mothers were in sufficiently close proximity to each other was made on the basis of several factors. At first, quantitative records from MIRA Makwanpur surveillance were examined to find mothers who had given birth more recently than 1 March 2008, and who lived in the same VDC and administrative ward as each other - Makwanpur is divided into 43 VDCs, each of which contains nine wards. For surveillance and management purposes, MIRA Makwanpur had further divided each ward into four sectors. Mothers were identified for potential focus group invitation if a sufficient number also resided in the same sector or immediately neighbouring sectors. After this initial screening process, the relative location of groups of potential invitees was assessed with map records and in consultation with MIRA Makwanpur staff familiar with the relevant local terrain. Further factors were taken into account at this stage, such as the presence of a

suitable meeting area in a central location for participants, or anticipated willingness of potential participants in a given community (one Maoist territory was deemed to harbour an extent of distrust of foreigners that would be unconducive to discussion of the research topics, and so was abandoned).

Ethnic group and birth attendance by mother-in-law. An additional factor in selecting participants for two of the group discussions was ethnic homogeneity – one meeting was held exclusively for a community of Tamang mothers, another for Praja (Chepang) mothers. This was done in order to help highlight any influence of ethnic group in perceptions and behaviours towards the discarding of colostrum.

A Tamang community was purposively selected because of the major representation of Tamangs as an ethnic group in Makwanpur, and the importance of describing this group in detail if generalised statements about the population are to be made. Tamangs may demonstrate early infant feeding practices that differ from other groups of Makwanpur, with previous sources suggesting that they traditionally put honey, sugar or ghee into the mouth of the newborn infant before breastfeeding, that mother's milk is believed to come only after the third day, and that colostrum is discarded under the belief that its viscosity will make it too hard for the newborn infant to swallow or that it is harmful[217,321].

Praja (Chepang) participants were selected in order to capture potential diversity within Makwanpur, as they represent a group that may be regarded as a 'special case' in several ways; Prajas frequently speak a Tibeto-Burman language (known as Chepang) distinct from other groups in Makwanpur, they often reside in ethnically homogeneous communities, and frequently practise a form of animism spirituality divergent from the Buddhism and Hinduism that predominate in the area[322], although increasing numbers are gradually converting to Christianity[323].

A third focus group discussion was convened on the basis of whether births had been attended by the participant's mother-in-law, or *sasu*. This was done in order to be able to potentially highlight any perceived impact, or difference in responses, amongst mothers who had their *sasu* as an attendant at birth. Mothers-in-law frequently play a dominant role in the life and decision-making of a young mother[321].

It was hypothesised that the advice and presence of a *sasu* might influence a new mother's practices and beliefs towards colostrum.

4.2.4 VDC Interviewer key informant semistructured interviews: Selection strategy

An initial criterion for potential key informant interview eligibility was that a VDC Interviewer should be located in a VDC where other semistructured interviews or focus group discussions with women were already planned to occur. This decision was made so that data could be collected without additional travelling time or cost. 11 VDCIs met these criteria, of which five were selected based on further factors. The decisions on which MIRA Makwanpur field staff to interview were made on the basis of their length of experience, the ethnic makeup of the VDC they conducted surveillance within, and the number of visits they had made to mothers during the course of quantitative surveillance. The aim was to learn from VDCIs who had either interacted with a large number of mothers, and/or who worked in a diverse or unique population relative to the rest of the district.

4.2.5 Hetauda District Hospital midwife key informant semistructured interviews: Selection strategy

Two interviews were arranged with midwives in Hetauda District Hospital on the basis of convenience for the hospital staff. Interview was conducted whenever a midwife was potentially available for up to 30 minutes, at a time when there would no burden or repercussions for hospital staff or patients.

4.3 DATA COLLECTION METHODS

Four sources of data were collected: semistructured interviews with recent mothers in Makwanpur, focus group discussions with mothers, semistructured interviews with MIRA Makwanpur VDC Interviewer key informants, and semistructured interviews with Hetauda District Hospital midwives. A strategy of multiple data sources and methods with triangulation adds rigour, breadth, and provides corroborative evidence in understanding the subject under study[324]. Interviews are a valuable method of exploring personal experience and feelings, and allow more focused and relevant questions[325]. Focus groups are a form of group interview that capitalise on communication between research participants in order to generate data, while also quickly generating data from several people simultaneously, and they may serve to lower the urge provide responses perceived to please the interviewer[326].

Interviews and focus group discussions were conducted by a Nepali female Research Assistant, who was recruited and trained specifically for the study. Interviews and focus group discussions were arranged and facilitated by MIRA Makwanpur field staff, with further staff taking notes at focus group discussions. In this section I describe the recruitment and training of the Research Assistant, the development and piloting of research tools including topic guides and information for participant consent, arrangement of semistructured interviews and focus group discussions, the format and content of the interviews and group discussions, note-taking and sound recording provision, and steps taken to build initial rapport with participants and facilitate open-ended dialogue. The next section focuses on analysis methods, including transcription and translation.

4.3.1 Research Assistant recruitment and training

Research Assistant recruitment. Candidates for the role were located through local advertisement and word of mouth. The assistant was recruited after structured interview, conducted by a panel that included senior MIRA Makwanpur staff with qualitative research experience (KM Tumbahangphe and R Thapa), a British academic with qualitative research expertise (J Morrison), and the primary researcher of the thesis investigation.

Research Assistant training. Training of the Research Assistant was partially achieved through specific activities organised for the purposes of training, and partially through feedback from early data collection.

Writing of all qualitative research tools, including topic guides and participant verbal consent information, was done in collaboration with the assistant in order to aid her familiarity with the topic. An initial day of open-ended discussion and informal teaching in issues in infant and maternal health, as well as the activities of MIRA, gave the Research Assistant a foundation in necessary vocabulary and concepts underpinning the study and the work of MIRA, as well as building her capacity to conduct future work in similar environments.

One practice semistructured interview was organised with a recent mother residing in an easily accessible community near Hetauda, attended by the primary researcher and two members of MIRA Makwanpur staff experienced in qualitative research techniques (R Thapa and M Manandhar). This was done so that preliminary feedback could be gained on the suitability of the topic guide, the assistant's interview technique and confidence, and what steps may be necessary to build sufficient rapport with interviewees. At this stage particular attention was paid to the Research Assistant's attitude, where the intention was not to give prescriptive advice to interviewees but instead to encourage them that all potential responses were of interest and there was no 'correct' answer to any question. It also became clear at this stage that it would be optimal for the Research Assistant to

memorise interview questions to achieve natural conversational fluidity with participants, as opposed to reading questions word-for-word from a sheet of paper. In a similar fashion, a practice interview was conducted with a MIRA Makwanpur Field Coordinator, to simulate dialogue with a VDC Interviewer key informant (Field Coordinators are the direct superiors of VDC Interviewers in the MIRA Makwanpur surveillance system, with overlap in questionnaire collection roles).

In the same easily accessible community as the practice mother interview, a focus group discussion was also arranged, again with the attendance of the primary researcher and two MIRA Makwanpur staff experienced in quantitative research techniques. All participants were mothers who had been included in quantitative surveillance. However, unlike all other focus group discussions they were not limited to mothers who had given birth within the previous year, and there was no common characteristic to the participants other than geographical location. This relaxation of the usual selection criteria (described above) was made so that mothers in close proximity to each other could be readily located for the purposes of the training discussion. Unintentionally, data generated from this focus group discussion were later deemed to be of sufficient quality to contribute to the study, despite differences in participant selection.

The Research Assistant spent two days in the maternity unit of Hetauda District Hospital, in order to observe postnatal mother-infant behaviour in a hospital environment; mothers remained in the ward for 24 hours after labour. This period of observation was conducted with the prior permission of the Makwanpur District Health Office head, and the senior staff midwife of the hospital maternity unit. During this time, two interviews with midwives were also conducted.

For transcription and translation, the Research Assistant was trained to use transcription hardware. Protocol was established on the standardised format that transcript translations to English should take, adopting notation frequently used in qualitative interview and focus group discussion transcripts[327].

Additional research employee: Focus group discussions. For periods of the study involving focus group discussions, a second Research Assistant (M

Manandhar) was employed as note taker and minute taker, and to aid group discussion. Her key role was to note which group participants made which contributions – this was necessary so that during tape transcription it would be possible to identify which participant had said what. The second Research Assistant was a member of MIRA Makwanpur staff, with substantial previous experience in similar roles gained during earlier qualitative investigations by the NGO. No further training was necessary, other than preparatory discussion of the format that note keeping would take.

4.3.2 Development of topic guides, verbal consent discussion, and participant information sheets

Topic guides. Separate topic guides were developed for interviews with mothers, with VDCIs, and with District Hospital midwives. Focus group discussions with mothers used the same topic guide as for individual interviews, although the precise way in which questions were introduced was adapted by the Research Assistant. All topic guides were created first in English by the primary researcher in consultation with a second academic experienced in qualitative research methods (J Morrison), and then adapted to initial Nepali versions in consultation with the Research Assistant. Although the three topic guides had differences relevant to each data source, the overall format and choice of topics demonstrated a degree of uniformity that aided consistency in discussion and comparability of themes generated in the analysis. Initial direction was also drawn from a qualitative MSc thesis conducted in 2001[328], in which perceptions of breastfeeding had been discussed with Tamang grandmothers in Makwanpur, amongst other topics.

Revisions to the topic guides were iterative and ongoing throughout the study, particularly after initial feedback from pilot training interviews, and early instances of interview transcription and translation to English. All revisions were made in

consultation between the primary researcher and Research Assistant. Topics were then introduced with broad open-ended questions, followed by prompts if necessary. The content of the interviews and group discussions is presented in more detail later.

Verbal consent discussion and participant information sheets. Before interviewing or recording took place in any interview or group discussion, the study was discussed with participants and consent was sought. A verbal consent discussion guide was developed in English and translated to Nepali. This was produced in order for consistent discussion of necessary information before gaining consent from each participant to conduct a recorded interview and to transfer copyright of the recordings and transcripts from the interviewee to the researcher. The following information was given to participants: the purpose of the study, how recordings would be used, how their information would remain anonymous and confidential, how recordings would be securely stored and destroyed upon the study's completion, and that the research presented no risk of harm to participants. Participants were informed that they could withdraw at any time without giving a reason, and given the opportunity to ask any further questions about the study.

4.3.3 Interview and focus group discussion arrangement, scheduling, and location

VDC Interviewers were employed to arrange interviews and focus group discussions with mothers. VDCIs made initial contact with mothers several days to weeks prior to data collection visits by the Research Assistant and primary researcher. After selecting potential mothers for interview as described in Section 4.2, an initial schedule for a logistically feasible programme of field visits was drafted in close consultation with senior members of MIRA Makwanpur staff (B Bhurathoki and R Neupane). VDC Interviewers were contacted at least a month before an intended interview or focus group discussion. After preliminary discussion

of availability for employment, and the logistical feasibility of suggested plans, the VDC Interviewers in turn contacted mothers to explain the study and learn if the mother was available and potentially willing to participate. Revisions to the field schedule were made in response to communication with VDC Interviewers where necessary, and if mothers were not available for visit.

For semistructured interviews, meetings were typically arranged at a mother's household. For focus group discussions, local community meeting places were selected by VDC Interviewers to invite mothers to: these were schools (two FGDs) or health posts (two FGDs).

Time and financial constraints did not allow for multiple visits to mothers, who were often over a day's journey away from the MIRA headquarters in Hetauda. Instead, VDC Interviewers made an initial preparatory visit as described, but mothers would only meet the Research Assistant and primary researcher on the day of data collection. This was deemed to be a tolerable issue in the building of trust and rapport before an interview or focus group discussion, because participant mothers would typically have some familiarity established with VDC Interviewers (who were also active high-profile members of their local community), the MIRA Makwanpur NGO was often held in high regard by mothers, and several hours were often spent with mothers before initiating taped discussion.

As established members of their local community, the employed VDC Interviewers in turn acted as local guides to the Research Assistant and primary researcher, helping locate the sites for mother interviews and FGDs, making food and sleeping arrangements, and granting the researcher access to communities. Semistructured interviews were arranged with the VDC Interviewers themselves as key informant participants at moments in the field where at least an hour of undisturbed time could conveniently be made available for the Research Assistant and VDCI together.

Transcription was scheduled between each series of interviews in different VDCs, so that iterative feedback could inform any necessary revision to topic guides before each subsequent field visit.

For the interviews with midwives in Makwanpur District Hospital, initial contact, including a discussion of the study's purposes, was made at a prior visit several days before interview. Participants were not paid for their time.

4.3.4 Format and content of semistructured interviews and focus group discussions

Preparatory briefing. Before each mother interview, the Research Assistant, VDC Interviewer and primary researcher conducted a short briefing. This outlined the participant's name(s), age, ethnic background, literacy, attendance at her most recent birth, and the age and sex of her most recent child for which MIRA Makwanpur surveillance data collection had taken place, which the Research Assistant would be asking questions about. The briefing's main purpose was to ensure that interview was in fact conducted with the intended sampled participant, and questions were asked about her most recent child.

Early in the study, briefings also informed the Research Assistant of whether the mother had previously reported that she discarded colostrum. However, as the study progressed it was decided that the Research Assistant should be kept blind to such information, in case her knowledge might affect the way in which questions were asked.

For focus group discussions, the number of invited participants and their range of ethnicities were noted. No briefings were necessary before interviews with VDCIs or midwives.

Preliminary rapport building. For semistructured interviews with mothers, a period of an hour to several hours was spent informally speaking together before any recorded discussion, in order to build rapport and help reduce participant nervousness. Topics discussed at this time typically included the health of the mother and her children, and the purpose of the study. The Research Assistant tried to encourage discussion of topics related to newborn care practices and early infant feeding in order to set the tone for the recorded interview. After several interviews, it was found that bringing food and drink and consuming these together with the mother and her family was a further effective strategy in encouraging comfortable free conversation. During this initial rapport-building period, typically the primary researcher would be present in addition to the Research Assistant, along with the VDC Interviewer, who was known to the mother already. Children and other family members were often also in attendance, frequently including the mother's *sasu* (mother-in-law). The primary researcher attended most interviews before the start of formal recording, in order to add legitimacy to the study, to gain an understanding of the context in which each interview took place, and to help inform any feedback and revision to the interview strategy or topic guides. One mother interview was also attended by a Maoist militia member, who wished to confirm that the purposes of the visit were not military or political.

In one case it was necessary to make several visits to a mother's home, spaced over a day, in order to build rapport and encourage her to have confidence to share her experiences. For all other cases, the preliminary period of discussion and actual recorded interview occurred in one continuous visit.

For focus group discussions with mothers, a similar set of strategies was adopted before recorded discussion. Informal conversation could occur during waits of typically over an hour, as mothers incrementally arrived at a meeting area. A register was taken of mothers attending each focus group discussion, in order to understand who the attending participants had been.

For semistructured interviews with VDCIs and Hetauda District Hospital midwives, rapport was typically well-established by the time of interview due to prior days of

interaction, and these key informant interviewees tended to be at ease in discussion.

Audio-recorded data collection. Prior to all interviews, after consent had been informally granted, the Research Assistant formally covered a verbal consent discussion and participants were guided through a participant information sheet. After any further questions from the interviewee, verbal consent for participation was then sought. The same procedure was adopted for focus group discussions, except that mothers were not provided with participant information sheets to take away.

During mother interviews and focus group discussions, the VDC Interviewer, primary researcher, and any other male attendees would typically leave the location of interview. This was a strategy adopted particularly in the latter half of the study, in order to further help reduce the nervousness of mothers, who could feel uncomfortable discussing issues related to breastfeeding and maternal and infant health in the presence of men and foreigners. It may have also reduced the perceived need amongst mothers to provide answers that would be seen as 'correct' or otherwise pleasing to the researcher. However, during the earlier stages of the study, it was deemed helpful for the primary researcher to discretely observe interviews from a distance, in order to be able to fully understand the interview process and to provide feedback or suggest revisions with the Research Assistant as necessary. Although basic, the primary researcher's grasp of Nepali language was sufficient to detect when whole sections of the topic guide had been omitted, or when an item had been incorrectly translated from English to Nepali or otherwise misunderstood. The primary researcher also frequently found himself in the role of distracting or entertaining the mother's children so that the Research Assistant and mother could remain undisturbed during interview. One focus group discussion in a Praja community required the attendance of the VDC Interviewer to act as a translator, because the mothers could not all speak Nepali confidently, and the Research Assistant could not speak Chepang.

The interviews and focus group discussions with mothers took a comparable format. The first questions after the start of recorded discussion were about the participant's background, her health and her children, in order to build conversation with subjects

familiar and comfortable to the mother. Topics were then discussed related to (i) the mother's interpretation of the question 'before feeding the baby for the first time, did you squeeze and throw the milk?' from the MIRA Makwanpur surveillance questionnaire collected previously, (ii) what the mother did with her first breastmilk and why, (iii) what advice she may have received about first breastfeeding, and what other mothers might be doing with their first breastmilk, and (iv) a series of questions informed by an earlier MSc thesis with Tamang grandmothers in Makwanpur[328], whereby mothers were asked about their understanding and feelings towards specific vocabulary related to early breastfeeding: *khil* (which approximately translates as 'dirt', 'pus', or a 'cork'), and *bighouti* (translating as 'colostrum'). (v) Mothers were also asked about how they breastfed in the days following birth, and the interviews and group discussions concluded with (vi) closing invitations for the mother to ask any further questions or make any further points. Topics were introduced with open-ended questions and discussion was focussed with prompts by the Research Assistant where necessary. The most recently revised version of the topic guide used both for semistructured interviews and focus group discussions with mothers is shown in Appendix F, although it should be noted that topics were not repeated in an identical fashion or identical order across interviews.

After completion of audio-recording, the participant was reminded of what would happen to the recording and how it would be used, reiterating confidentiality and reminding her that if she had any further questions or concerns at a later date, the primary researcher could be contacted through methods described on the participant information sheet.

Interviews with VDCIs covered fewer topics. It was particularly necessary to assure confidentiality with VDCIs, to regularly reiterate that their performance in their job was not being assessed, and that there were no 'correct' answers. In addition to introductory questions on the key informant's background, VDCIs were asked their interpretation of the MIRA Makwanpur surveillance questionnaire and particularly the question on discarding of first milk, how they asked mothers that questionnaire item and the sorts of responses mothers gave, or any problems in classifying their responses. Any further points or questions were also invited. The most recently revised version of the topic guide used for semistructured interviews with VDCIs is shown in Appendix G.

Interviews with midwives focused on what they observed mothers doing with their first breastmilk after birth, and what advice they give to them about first breastmilk.

Usage of audio-recordings. All interviews and focus group discussions were recorded using an analogue tape recorder in addition to a digital recorder. Digital recordings were backed up on to the primary researcher's laptop. Data were transcribed from the tape recordings as a first source, with the digital reserve copies required on occasional instances of technological failure or user error.

The decision was made to tape interviews because the recordings allowed in-depth transcription of detail shared during the discussions, and it was deemed that any effect on a participant's behaviour due to the visible presence of a tape recorder would be minimal. Focus group discussions were additionally noted in shorthand by the further research employee to aid recognition of which participant made which contribution when transcribing dialogue from tape.

4.3.5 Ethical considerations

The qualitative investigation fell within the remit of the ethical provision granted for the research activities of MIRA Makwanpur, which have been approved by the Nepal Health Research Council and the ethics committee of the Institute of Child Health and Great Ormond Street Hospital for Children. Participant confidentiality was ensured through the coding of mothers and infants to unique identification numbers and removal of name information. Tapes were held securely in a locked storage space in the MIRA Makwanpur headquarters, and were destroyed upon the study's completion (October 2010). The Research Assistant's period of postnatal observation in Makwanpur District Hospital was conducted with the prior permission of the Makwanpur District Health Office head and the senior staff midwife of the hospital maternity unit.

4.4 DATA ANALYSIS METHODS

Focus group discussions and individual interviews were transcribed by hand in Nepali, verbatim from the audio recordings, before translation to English. English translations were typed using Microsoft Word 2003 (Microsoft Corporation, Redmond, WA, USA). Translations were checked upon completion for instances of ambiguity, and clarified with the Research Assistant before revisions, referring to original recordings again if necessary. This was conducted in the days shortly following an interview, so that precise events from field visits were still available to memory.

Qualitative analysis was performed by the primary researcher using QSR NVivo version 7 (QSR International, Melbourne Australia, 2007) within the theoretical framework of grounded theory. NVivo 7 software facilitated thematic analysis through the creation of 'nodes' which in turn can be grouped.

A thematic structure to the interview transcripts was to an extent predefined by the distinct topics introduced during interviews and focus group discussions, although further thematic structure was allowed to emerge. Analysis occurred in several stages. First, all transcripts were read through by the primary researcher as soon as they became available, to gain overall familiarity with the data in addition to checking for potential errors. A preliminary list of potential themes was generated at this stage, and transferred to NVivo as 'free nodes'. In the next stage, transcripts were analysed and coded systematically, with free nodes created for any additional themes that arose. Nodes were grouped in a structure of 'parent' and 'child' nodes where deemed appropriate. Any free nodes that did not appear to fit into a parent-child node structure were kept as free nodes.

Generation and revision of nodes and parent-child structure was ongoing as analysis continued, with a method of constant comparative analysis[329]. Constant comparative analysis is used predominantly in grounded theory studies, whereby one piece of data is compared with others, allowing development of possible relations between pieces of data and theories to explain behaviour or experience.

Mother interviews, focus group discussions and VDCI interviews were analysed in groups by the geographical region and field visit they were conducted within. This allowed ongoing comparison and triangulation between related data sources, as data from (i) the mothers in a VDC, and (ii) the VDC Interviewer who had worked with those mothers, were considered consecutively, but in the context of themes generated from the wider data. Interviews with midwives were treated separately. Discrepant or unique cases, describing sentiments unique or contrary to data observed elsewhere, were also identified. An overall synthesis of behaviours and beliefs amongst mothers in Makwanpur regarding the discarding of colostrum was generated from this stage of analysis. Assessment was also made of how mothers' behaviours may have been categorised in the MIRA Makwanpur surveillance tool.

For each mother interview, information was available from prior MIRA Makwanpur surveillance on whether she had reported that she discarded colostrum or not. It was noted during preliminary checking of transcripts that the mother's described actions and opinions relating to first milk did not always appear congruent with her earlier reported colostrum discarding status. This could be attributable to a wide range of reasons, including social desirability bias whereby the mother provided answers perceived to please the researcher or avoid stigma, or because the mother may have misunderstood the original MIRA Makwanpur surveillance question about discarding of colostrum. In order to cross-check such concerns and their potential implications, all mother interview transcripts were reviewed by two of the researcher's supervisors (D Osrin and N Saville), who guessed whether each transcript came from a mother who discarded colostrum or not according to earlier MIRA Makwanpur surveillance. The reviewers were blind to whether the mother had in fact previously reported colostrum discarding or not.

Results from the qualitative data analysis are described in Chapter 7 of the thesis.

CHAPTER 5: QUANTITATIVE RESULTS - MAKWANPUR

In Chapter 3 I described the setting of the MIRA Makwanpur women's group trial, its surveillance system, and quantitative methods adopted to examine the association of a number of early infant feeding exposures with neonatal outcomes. Data on 17 733 married women of reproductive age and their newborn infants were collected from February 2001 to February 2008. The results of the analyses based upon this data are presented in this chapter. There were a total of 15 919 singleton infants born at term without abnormalities, who survived two days and initiated breastfeeding, of whom 117 died within the neonatal period.

The primary objective of the analyses was to examine the association between maternally reported discarding of first breastmilk and neonatal mortality in Makwanpur. Secondary objectives were to: (i) examine any association between discarding of first milk and suspected acute respiratory infection (ARI); (ii) analyse risk of infection-specific neonatal mortality by first milk discarding status, based on categorisation derived from verbal autopsy data; (iii) clarify any relationship between prelacteal feeding and neonatal mortality; (iv) replicate previous analyses of breastfeeding initiation time and neonatal mortality; (v) replicate previous analyses of established breastfeeding patterns (exclusive and non-exclusive breastfeeding) and neonatal mortality; and (vi) explore characteristics predicting the discarding of first milk as a risk-factor analysis.

In this chapter I first present a descriptive overview of the data, and then in turn address each of the thesis objectives relating to quantitative methods. In each instance, a summary of the findings is accompanied by basic interpretation. The chapter concludes with a general summary.

5.1 HOUSEHOLD AND PARTICIPANT CHARACTERISTICS

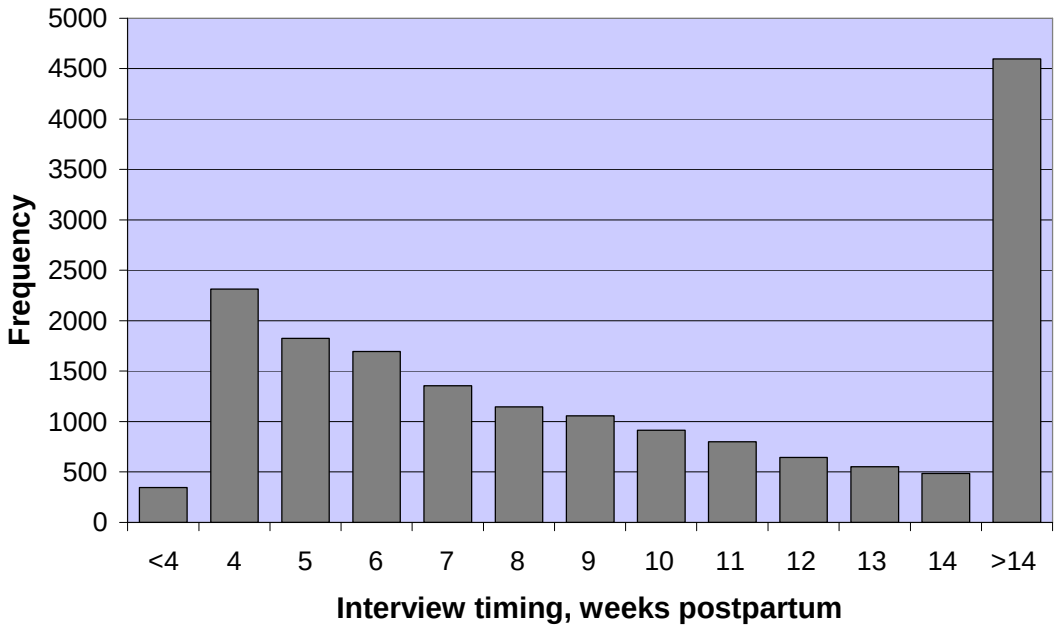
There were 17 733 live and stillbirths in the MIRA Makwanpur trial area from February 1 2001 to February 1 2008, 8183 during Phase I and 9550 during Phase II. Live births were followed by 469 neonatal deaths, giving a neonatal mortality rate of 26.4 per 1000 live births. There were 15 919 singleton live infants born at term who survived 48 hours and met the inclusion criteria described in Section 3.8. In this low-risk group, there were 117 deaths (of which 34 were early neonatal deaths), giving a neonatal mortality rate of 7.3 per 1000 live births. There were no refusals to participate.

The purpose of this section is to present a descriptive overview of the quantitative data generated from Makwanpur, and to assess the suitability of decisions made in the choice of exclusion criteria and potential confounders adjusted for in analyses. Unless otherwise stated, the descriptive statistics refer to all 17 733 live and stillbirths, and not only those infants meeting analysis inclusion criteria. In general, where mortality data or comparison of participants who did or did not discard colostrum are presented, findings are for the study sample after application of the exclusion criteria, whereas the entire sample is included when other population characteristics are described.

5.1.1 Timing of interviews

The median time of interview after birth was nine weeks, with an interquartile range of 5-15 weeks (Figure 5.1). The most common week of interview was four completed weeks after birth (28-34 days postpartum). 347 interviews (2%) were conducted earlier than 28 days postpartum. 4597 (26%) were conducted after 14 weeks due to pronounced civil conflict in the region and seasonal migration of mothers, particularly during Phase II surveillance (for Phase I, only 10% of interviews were conducted after 14 weeks). As a result, data and analyses from Makwanpur must be interpreted judiciously, since responses rely on maternal recall of the neonatal period, and specific questions such as “at the moment, are you feeding the baby only mother's milk or are you giving some other things like water, lactogen or cow or buffalo milk as well?” decline in applicability to any one time period.

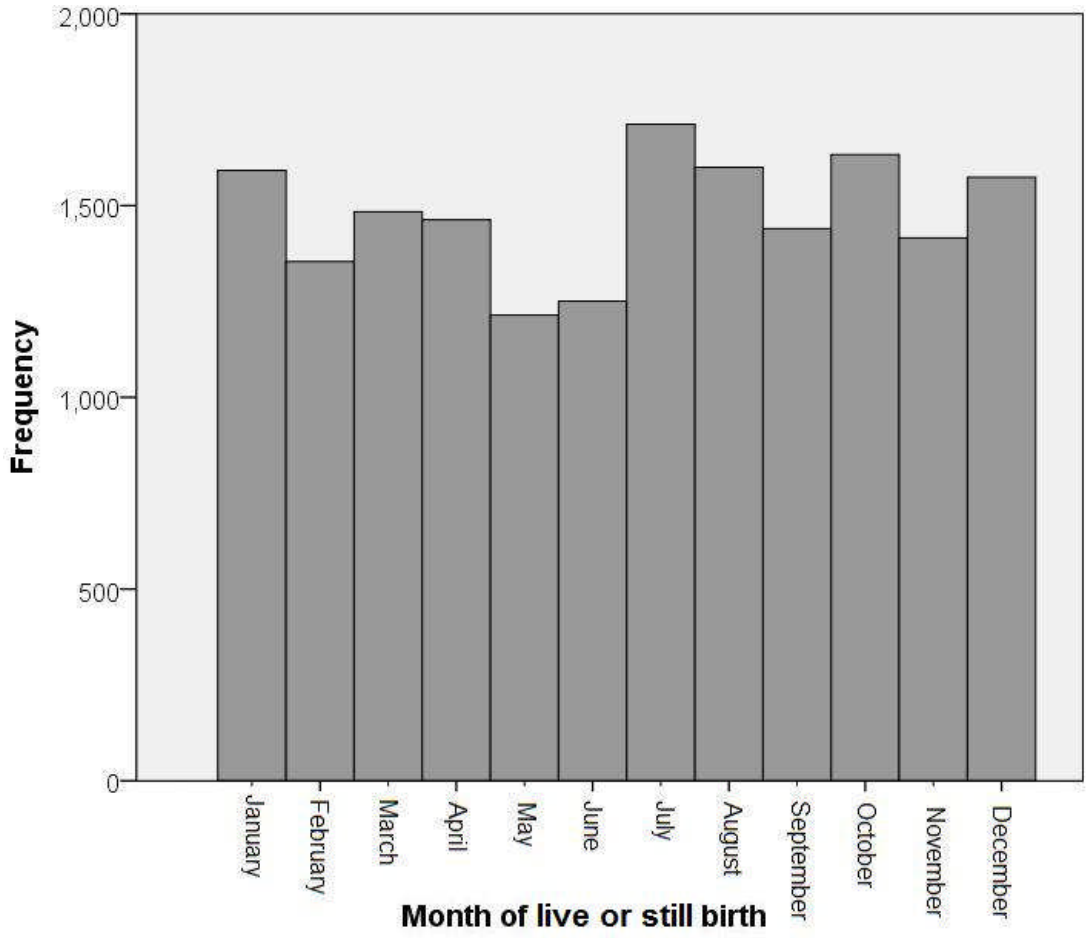
Figure 5.1: Timing of field interviewer visit after birth, completed weeks postpartum (n = 17 733)



5.1.2 Month of birth

The spread of live and stillbirths was approximately even across the year (Figure 5.2). May and June may have exhibited a slightly reduced mean number of live and stillbirths per year (173 and 179 respectively) compared to the mean number of live and stillbirths per month over the remainder of the year (218 per year). The profile of month of birth was comparable for mothers who did or did not discard colostrum, and also showed no difference between infants who met or did not meet the inclusion criteria.

Figure 5.2: Month of live births and stillbirths, 2001 to 2008 (n = 17 733)



5.1.3 Household and participant characteristics: Overall

Table 5.1 shows a range of household and participant characteristics of the study sample. Comparison by colostrum discarding status is presented later.

Table 5.1: Study sample household and participant characteristics (n = 17 733)

Characteristic	Number (%)
Maternal Status	
Basic or higher literacy [a]	6966 (40.2)
Maternal Religion	
Buddhist	10 844 (61.2)
Hindu	6547 (36.9)
Maternal Ethnicity	
Tamang	11 382 (64.2)
Brahmin / Chhetri	2770 (15.6)
Maternal Demographic Characteristics	
Mother's age at delivery in years: Mean (SD)	Mean 26.6 (SD 6.5)
Mother had previous pregnancy [b]	7345 (44.1)
Previous pregnancy resulted in neonatal mortality	1176 (6.6)
Breastfeeding Practices	
Given prelacteal feeds [c]	1647 (9.6)
Initiated early (≤24 hours)	16 549 (93.3)
Discarded colostrum [c]	5592 (32.4)
Exclusively breastfed after one month [c]	16009 (92.8)
Infant Characteristics	
Female infant sex	8459 (47.7)
Health System and Birth Environment	
Mother received any antenatal care	9824 (55.4)
Birth assisted by skilled birth attendant (doctor, nurse, health assistant or auxiliary nurse midwife)	1726 (9.7)
Birth assisted by traditional birth attendant	905 (5.1)
Birthplace at home	13 633 (76.9)
Residence in VDC Receiving Women's Group Intervention	
Phase I exposure (years 2001-2005)	7428 (41.9)
Phase II exposure (years 2005-2008)	15 446 (87.1)
Total	**17 733 (100)**

[a] Excludes consideration of 404 mothers where literacy data were absent
[b] Excludes consideration of 1073 mothers where previous pregnancy data was absent
[c] Excludes consideration of 488 mothers who did not initiate breastfeeding

5.1.4 Causes of neonatal death

Of the 469 neonatal deaths in the study period (before application of exclusion criteria), cause of death was classified for 299 cases – deaths were classified over only a 15 month period in Phase II (September 1 2006 to November 30 2007). Table 5.2 indicates that before application of exclusion criteria, infection accounted for nearly half of neonatal deaths (47%), followed by causes related to asphyxia (34%) and prematurity (8%). After application of the exclusion criteria (Table 5.2, third column), severe infection accounted for a large majority of deaths (84%), and the profile of causes of death was the same for infants of mothers who did and did not report colostrum discarding.

There was a gradient in the causes of neonatal death as day of death advanced (Table 5.3). In the days immediately following birth, asphyxia and birth trauma accounted for most deaths (56% of deaths in the first 72 hours after birth), whereas late neonatal deaths were primarily attributable to severe infection (82% of late neonatal deaths). These findings lend weight to the validity of the study classifications, since they broadly agree with changes in the profile of causes of death from the early to the late neonatal period described by other authors[30,31]. The findings also suggest that the exclusion criteria are adequate in limiting analysis only to types of neonatal death potentially influenced by early infant feeding practices, since the majority of deaths attributed to asphyxia, obstetric complications and prematurity are removed by excluding from analysis infants who died in the first two days of life.

Table 5.2: Neonatal death classifications: Before exclusion criteria (n = 299), after exclusion criteria (n = 74), and compared by colostrum discarding after application of exclusion criteria

Figures are n (%)	**Before application of exclusion criteria**	**After application of exclusion criteria**		
Cause of death	**Overall (n = 299)**	**Overall (n = 74)**	**Discarded colostrum (n = 47)**	**Did not discard colostrum (n = 27)**
Asphyxia / asphyxia with obstetric complications	103 (34.4)	7 (9.5)	4 (8.5)	3 (11.1)
Severe infection	140 (46.8)	62 (83.8)	39 (83.0)	23 (85.2)
Prematurity	24 (8.0)	1 (1.4)	1 (2.1)	0 (0)
Hypothermia	9 (3.0)	0 (0)	0 (0)	0 (0)
Congenital anomaly	5 (1.7)	0 (0)	0 (0)	0 (0)
Low birth weight	5 (1.7)	0 (0)	0 (0)	0 (0)
Other	7 (2.3)	2 (2.7)	2 (4.3)	0 (0)
Unclassifiable	6 (2.0)	2 (2.7)	1 (2.1)	1 (3.7)
Total deaths	**299 (100)**	**74 (100)**	**47 (100)**	**27 (100)**

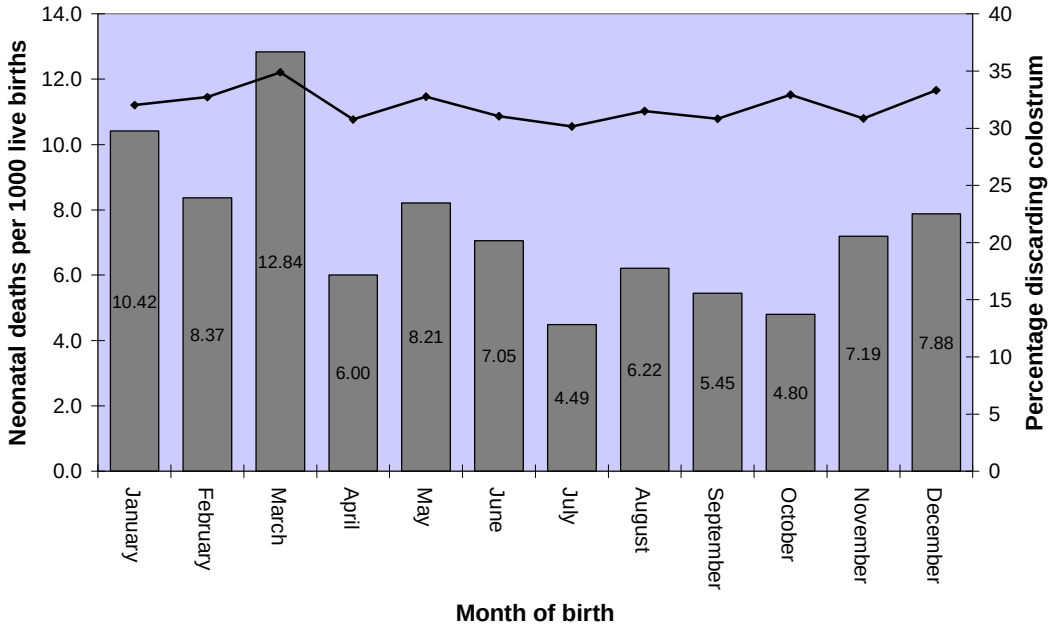
Table 5.3: Causes of death by day of death, before exclusion criteria (n = 299)

Figures are n (%)		Days of survival (where 0 is death on day of birth)						
		0	**1**	**2**	**3 to 6**	**7 to 13**	**14 to 20**	**21 to 27**
Neonatal death classification	Asphyxia / asphyxia with obstetric complication	62 (67.4)	15 (48.4)	3 (15.8)	12 (24.0)	8 (18.2)	2 (5.6)	1 (4.5)
	Severe infection	4 (4.3)	10 (32.3)	11 (57.9)	27 (54.0)	33 (75.0)	31 (86.1)	20 (90.9)
	Prematurity	12 (13.0)	3 (9.7)	1 (5.3)	6 (12.0)	1 (2.3)	0 (0)	0 (0)
	Hypothermia	8 (8.7)	0 (0)	1 (5.3)	0 (0)	0 (0)	0 (0)	0 (0)
	Congenital anomaly	1 (1.1)	1 (3.2)	1 (5.3)	2 (4.0)	0 (0)	0 (0)	0 (0)
	Low birth weight	0 (0)	1 (3.2)	1 (5.3)	1 (2.0)	2 (4.5)	0 (0)	0 (0)
	Other	4 (4.3)	1 (3.2)	0 (0)	1 (2.0)	0 (0)	1 (2.8)	0 (0)
	Unclassifiable	1 (1.1)	0 (0)	1 (5.3)	1 (2.0)	0 (0)	2 (5.6)	1 (4.5)
Total deaths		**92 (100)**	**31 (100)**	**19 (100)**	**50 (100)**	**44 (100)**	**36 (100)**	**22 (100)**

5.1.5 Seasonality of neonatal mortality and colostrum discarding

Although there was little evidence of seasonality of births, some months accounted for a greater frequency of neonatal deaths than others after application of the exclusion criteria (Figure 5.3). Mortality rates appeared to be lower during the monsoon season (late June to September). The proportion of mothers discarding colostrum was more stable, ranging from 30-35%, although lower rates may have also been observed over the monsoon season. The findings corroborate the potential need to adjust for season of birth in analyses presented.

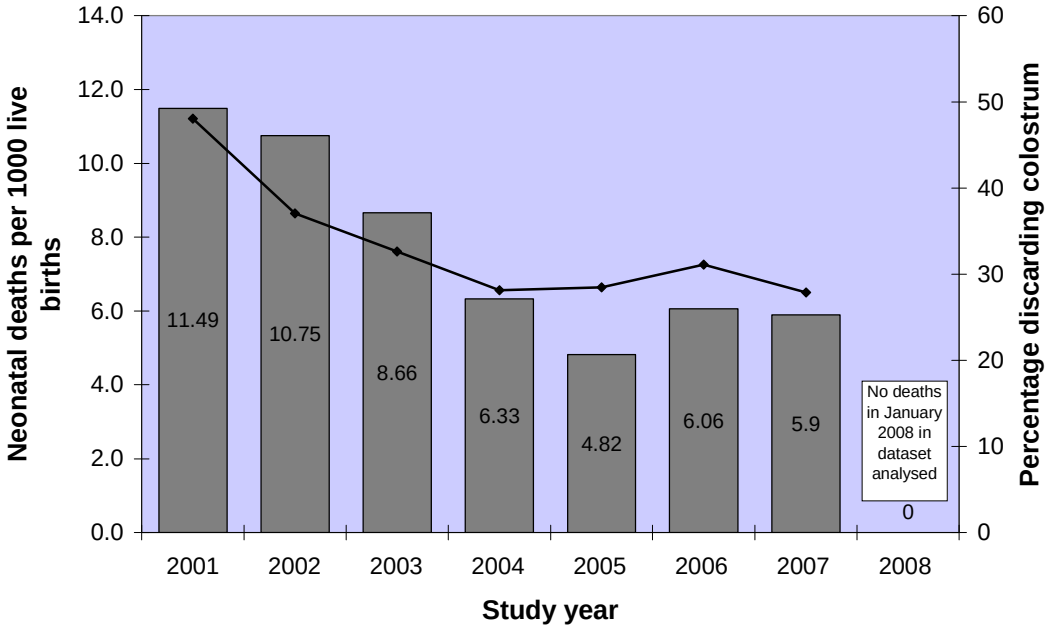
Figure 5.3: Neonatal mortality rate (bars) and colostrum discarding rate (line) by month, after application of exclusion criteria, 2001 to 2008



5.1.6 Secular trend in neonatal mortality and colostrum discarding

Neonatal mortality rates declined from 2001 to 2008 (Figure 5.4). Reported rates of colostrum discarding also declined. The findings corroborate the need to adjust for date of birth as a potential confounding variable in analyses. They also confirm that usage of survival analysis methods such as Cox regression would have been unsuitable for the primary analysis, since one necessary assumption is that the probability of mortality remains constant for participants enrolled at different times in the study[290]. It is beyond the scope of the thesis to discuss the extent to which these apparent trends of mortality decline and early infant feeding improvements were attributable to the MIRA women's group intervention or to a general secular trend of improvement in the region.

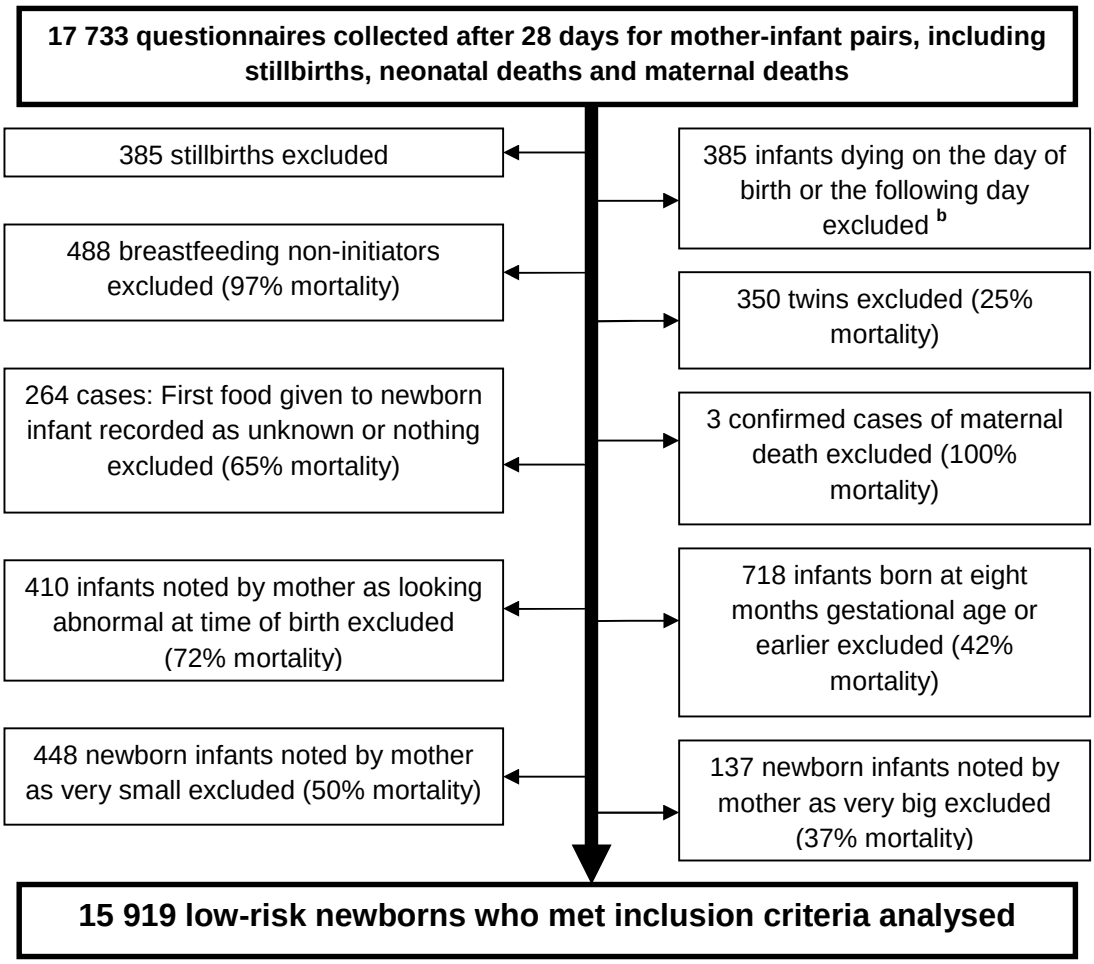
Figure 5.4: Neonatal mortality (bars) and colostrum discarding rates (line) by study year, after application of exclusion criteria, 2001 to 2008



5.1.7 Profile of exclusion criteria

Figure 5.5 (adapted from Figure 3.5) demonstrates how many infants met each of the pre-analysis exclusion criteria employed to limit the influence of reverse causality. 1814 infants were excluded. Each infant could fall under several exclusion criteria simultaneously, and analyses presented in Section 5.2 were repeated with the exclusion of all early neonatal deaths.

Figure 5.5: Profile of infant exclusion criteria for analysis, Makwanpur [a]



[a] One infant could meet several exclusion criteria.

[b] Primary analysis repeated with exclusion of all early neonatal deaths (days 1-7)

5.1.8 Household and participant characteristics by colostrum discarding status after application of exclusion criteria

Colostrum was discarded by 32% of participants. Table 5.4 compares key household and participant characteristics amongst mothers who did and did not report that they discarded their first breastmilk, after application of the exclusion criteria. Several characteristics were not evenly distributed between the two groups, with discarders of colostrum tending to be of lower socioeconomic status and practising less favourable newborn care practices; mothers who discarded colostrum were less likely to be basically literate, tended to be poorer, were more likely to be of Tamang ethnicity, and were less likely to receive skilled birth attendance or antenatal care. Residence in VDCs where the mother's group intervention had been implemented also appeared to influence the distribution of reported colostrum discarding - colostrum discarders were less likely to have been exposed to the women's group intervention.

Figure 5.6 shows the distribution of wealth amongst mothers who reported discarding colostrum and those who did not. The proportion of colostrum discarders in each wealth quintile progressively decreased as wealth increased. Over a third of the poorest fifth of the population were colostrum discarders, compared with less than a quarter of the wealthiest fifth.

Table 5.4: Comparison of study sample household and participant characteristics amongst colostrum discarders and non-discarders after application of exclusion criteria (n = 15 919)

Figures expressed as n (% displaying characteristic)

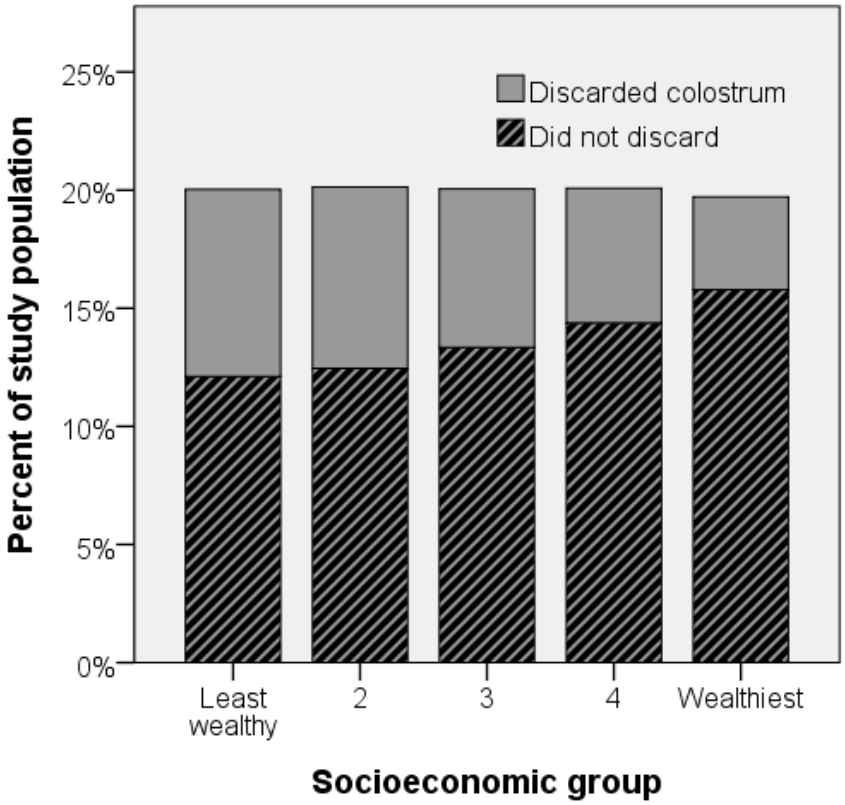
Characteristic	Discarded colostrum (n = 5088) Frequency (%)	Did not discard colostrum (n = 10 831) Frequency (%)
Maternal Status		
Basic or higher literacy [a]	1431 (28.9)	4856 (45.8)
Mother's household in wealthiest 40% of the population [b]	1535 (30.2)	4799 (44.3)
Maternal Religion		
Buddhist	3562 (70.0)	6235 (57.6)
Hindu	1444 (28.4)	4376 (40.4)
Maternal Ethnicity		
Tamang	3799 (74.7)	6479 (59.8)
Brahmin / Chhetri	453 (8.9)	1984 (18.3)
Maternal Demographic Characteristics		
Mother's age at birth in years: Mean (SD)	Mean 26.9 (SD 6.9)	Mean 26.3 (SD 6.2)
Mother had previous pregnancy [c]	2061 (43.2)	4647 (45.5)
Previous pregnancy resulted in neonatal mortality	402 (7.9)	631 (5.8)
Breastfeeding Practices		
Given prelacteal feeds	335 (6.6)	1112 (10.3)
Initiated early (≤24 hours)	4941 (97.1)	10 425 (96.3)
Exclusively breastfed after one month	4780 (93.9)	10 126 (93.5)
Infant Characteristics		
Sex of infant female	2444 (48.0)	5195 (48.0)
Health System and Birth Environment		
Birth assisted by skilled birth attendant (doctor, nurse, health assistant or auxiliary nurse midwife)	221 (4.3)	1212 (11.2)
Birth assisted by traditional birth attendant	137 (2.7)	668 (6.2)
Birthplace at home	4043 (79.5)	8322 (76.8)
Mother received any antenatal care	2264 (44.5)	6558 (60.5)
Residence in VDC Receiving Women's Group Intervention		
Phase I exposure (years 2001-2005)	1746 (34.3)	4902 (45.3)
Phase II exposure (years 2005-2008)	4368 (85.8)	9508 (87.8)
Total	**5088 (100)**	**10 831 (100)**

[a] Excludes consideration of 365 mothers for whom literacy data were absent

[b] See Figure 5.6 for further detail

[c] Excludes consideration of 944 mothers for whom previous pregnancy data were absent

Figure 5.6: Distribution of mothers discarding colostrum or not, by stacked wealth quintiles derived from principal components analysis scoring of asset ownership data, after exclusion criteria (n = 15 919) [a] [b]



[a] Each bar represents approximately one fifth of the total study population

[b] The y axis represents percentage of total study population per bar – the five bars contain a mean of 20% of the study population; if all five bars were added on top of each other, they would add to 100%

5.1.9 Relationship between colostrum discarding and breastfeeding initiation time

In unadjusted analysis, colostrum discarding displayed a weak association with breastfeeding initiation time (Table 5.5). Mothers who discarded colostrum were marginally less likely to have initiated breastfeeding after 24 hours. One dimension does not appear to predict the other, and they may be interpreted as independent for Makwanpur, with minimal concern of colinearity in analysis.

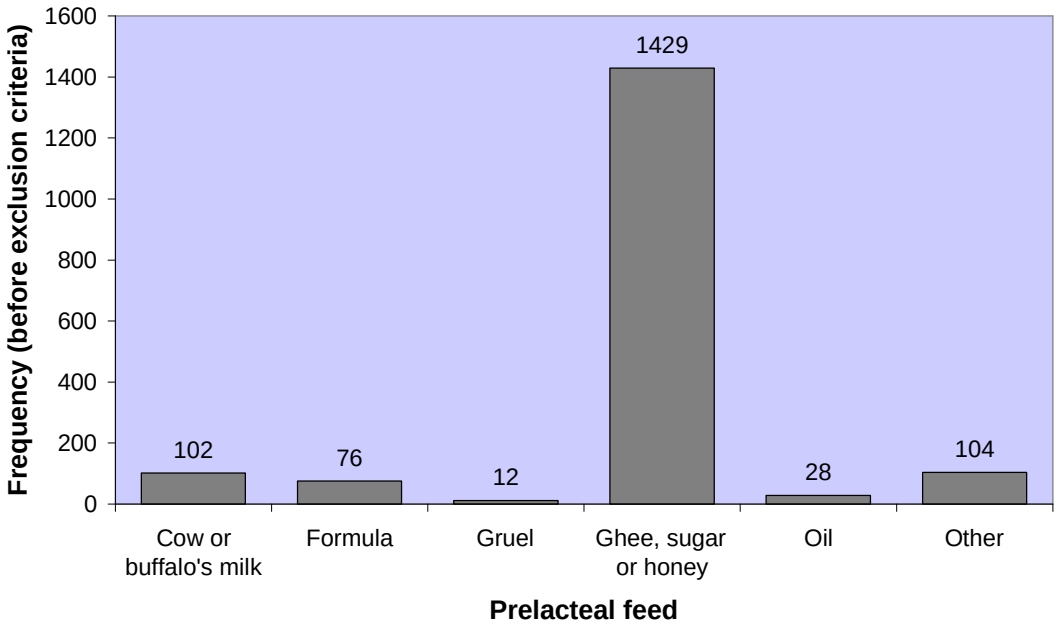
Table 5.5: Colostrum discarding by breastfeeding initiation category in singletons born at term who initiated breastfeeding and survived 48 hours (n = 15 919). Figures displayed as n (row %)

Breastfeeding initiation time	**Discarded colostrum (n = 5088)** Frequency (%)	**Did not discard colostrum (n = 10 831)** Frequency (%)	**Total** Frequency (%)
Within 1h	3078 (31.1)	6809 (68.9)	9887 (100)
From 1h to end day 1	1863 (34.0)	3616 (66.0)	5479 (100)
Day 2	59 (24.8)	179 (75.2)	238 (100)
Day 3	66 (27.8)	171 (72.2)	237 (100)
After day 3	22 (28.2)	56 (71.8)	78 (100
Spearman's rank correlation, p = 0.18 Independent samples t test, uncategorized breastfeeding initiation time treated as continuous, p = 0.062			

5.1.10 Types of prelacteal feed

Figure 5.7 shows the distribution of prelacteal feeds given to infants, before application of the exclusion criteria. The combined option of ghee (clarified butter), sugar or honey was by far the most common response, followed by cow or buffalo milk and 'other'. The distribution of reported prelacteal feeds remained the same after application of the analysis exclusion criteria.

Figure 5.7: Frequency of types of prelacteal feed, before exclusion criteria (n = 17 733)



5.1.11 Relationship between colostrum discarding and prelacteal feeding

In unadjusted analysis, mothers who discarded colostrum were less likely to have also given their newborn infants prelacteal feeds (Table 5.6), with the two variables demonstrating a significant association in χ-square analysis of a 2x2 table. The results of Table 5.6 are not paradoxical: given that mothers were asked "before feeding the baby for the first time, did you squeeze and throw milk?" to ascertain colostrum discarding, as well as "what was the first food given to the baby" to ascertain prelacteal feeding, and that the majority of mothers who reported discarding colostrum also reported initiating breastfeeding within one day (Table 5.5), it appears feasible that a mother could discard some of her first breastmilk but still promptly give a prelacteal feed and/or her own milk to the infant. Discarding of some colostrum does not mean withholding of all colostrum, and absence of prelacteal feeds in this instance does not mean the infant received nothing in the first days postpartum.

Table 5.6: Colostrum discarding by prelacteal feeding status in singletons born at term who initiated breastfeeding and survived 48 hours (n = 15 919). Figures displayed as n (row %)

	Discarded colostrum (n = 5088)	Did not discard colostrum (n = 10 831)	Total
No prelacteal feeding	4753 (32.8)	9719 (67.2)	14 472 (100)
Prelacteal feeding	335 (23.2)	1112 (76.8)	1447 (100)
Pearson χ-square with continuity correction, $p < 0.0001$			

5.2 PRIMARY ANALYSIS - DISCARDING OF FIRST MILK AND NEONATAL MORTALITY

5.2.1 Primary analysis: Infants surviving 48 hours

Analysis was conducted of the association between maternally reported discarding of first breastmilk and neonatal mortality, after application of the exclusion criteria as described in Figure 5.5. Colostrum was discarded for 32% of singletons born at term who initiated breastfeeding and survived 48 hours, and there were a total of 117 deaths, giving a rate of 7.3 deaths per 1000 live births (Table 5.7). The neonatal mortality rate was 12.8 deaths per 1000 live births amongst infants of mothers who reported that they discarded colostrum, compared to 4.8 amongst non-discarders, giving a crude odds ratio of 2.68 (1.86-3.87, p<0.0001).

Presentation of results. Table 5.7 displays adjusted odds ratios generated from a progression of random effects logistic regression models as described in Section 3.8, comparing risks of neonatal mortality according to colostrum discarding status in singletons born at term who initiated breastfeeding and survived at least 48 hours. Each model is nested within the next to test for improvement of fit with likelihood ratio tests; the crude unadjusted model above is nested within model (i) (aOR1in Table 5.7), model (i) is nested within model (ii) (aOR2), and so on. Including 14 covariates, (i) represents the simplest adjusted model, (ii) and (iii) are of equal complexity and contain 15 terms (the fifteenth term in each case being prelacteal feeding and breastfeeding initiation time respectively), while (iv) contains 16 terms (including both prelacteal feeding and breastfeeding initiation time).

Principal findings. Table 5.7 indicates that the adjusted odds ratio for neonatal mortality amongst colostrum discarders compared to non-discarders was 2.23 (95% CI: 1.48 - 3.35) in the context of a wide range of potential confounding variables (aOR1), and the effect remained significant, converging to 2.21 (95% CI: 1.47 - 3.32) after the addition of prelacteal feeding and breastfeeding initiation time as

terms in the model (aOR4). The findings demonstrate a highly significant association between colostrum discarding and neonatal mortality, after adjustment for a wide range of potential confounding variables including other dimensions of early infant feeding, and suggest that discarding of colostrum is a major risk factor for all-cause neonatal mortality.

Likelihood ratio tests comparing the fit of each model suggest that model 1 (aOR1, Table 5.7) had significantly better fit than a crude unadjusted model with no covariates other than colostrum discarding and neonatal death. The addition of prelacteal feeding as a term (aOR2 and aOR4) did not improve fit over model 1, while the addition of breastfeeding initiation time alone (aOR3) led to a suggestive but marginally non-significant improvement in fit over model 1 (p=0.07).

Table 5.7: Odds of neonatal mortality according to colostrum discarding status in singletons born at term who initiated breastfeeding and survived 48 hours

	No. (%) of Neonates	Deaths (%)	Rate, per 1000 live births	aOR1 (95% CI; p)[a]	aOR2 (95% CI; p)[b]	aOR3 (95% CI; p)[c]	aOR4 (95% CI; p)[d]
Colostrum not discarded	10 831 (68.0)	52 (44.4)	4.8	1	1	1	1
Colostrum discarded	5088 (32.0)	65 (55.5)	12.8	2.23 (1.48 – 3.35; p<0.0001)	2.22 (1.48 – 3.35; p<0.0001)	2.21 (1.47 – 3.33; p<0.0001)	2.21 (1.47 – 3.32; p<0.0001)
LRT, p [e]	-	-	-	p<0.0001	p=0.611	- [f]	p=0.398 [g]
PAR, % (95% CI) [h]	-	-	-	-	-	-	30.4 (17.8 - 38.8)
Total	15 919 (100)	117 (100)	7.3				

[a] Odds ratio 1 adjusted for exposure to the women's group intervention, household religion, season of birth, maternal literacy, maternal age, primiparity, previous neonatal death, number of antenatal care visits, home birth, skilled birth attendance, infant sex, date of birth, exclusive breastfeeding, and socioeconomic status

[b] Odds ratio 2 adjusted for all factors listed for aOR1, plus prelacteal feeding

[c] Odds ratio 3 adjusted for all factors listed for aOR1, plus breastfeeding initiation time

[d] Odds ratio 4 adjusted for all factors listed for aOR1, plus prelacteal feeding and breastfeeding initiation time

[e] Likelihood ratio test checks for improvement in model fit, nesting each model in the next; the crude model is nested in model 1 (aOR1), model 1 in model 2 (aOR2), model 2 could not be nested in model 3 because of equality in degrees of freedom, and model 3 is nested in model 4 (aOR4)

[f] Likelihood ratio test, nesting model 1 in model 3: p=0.070

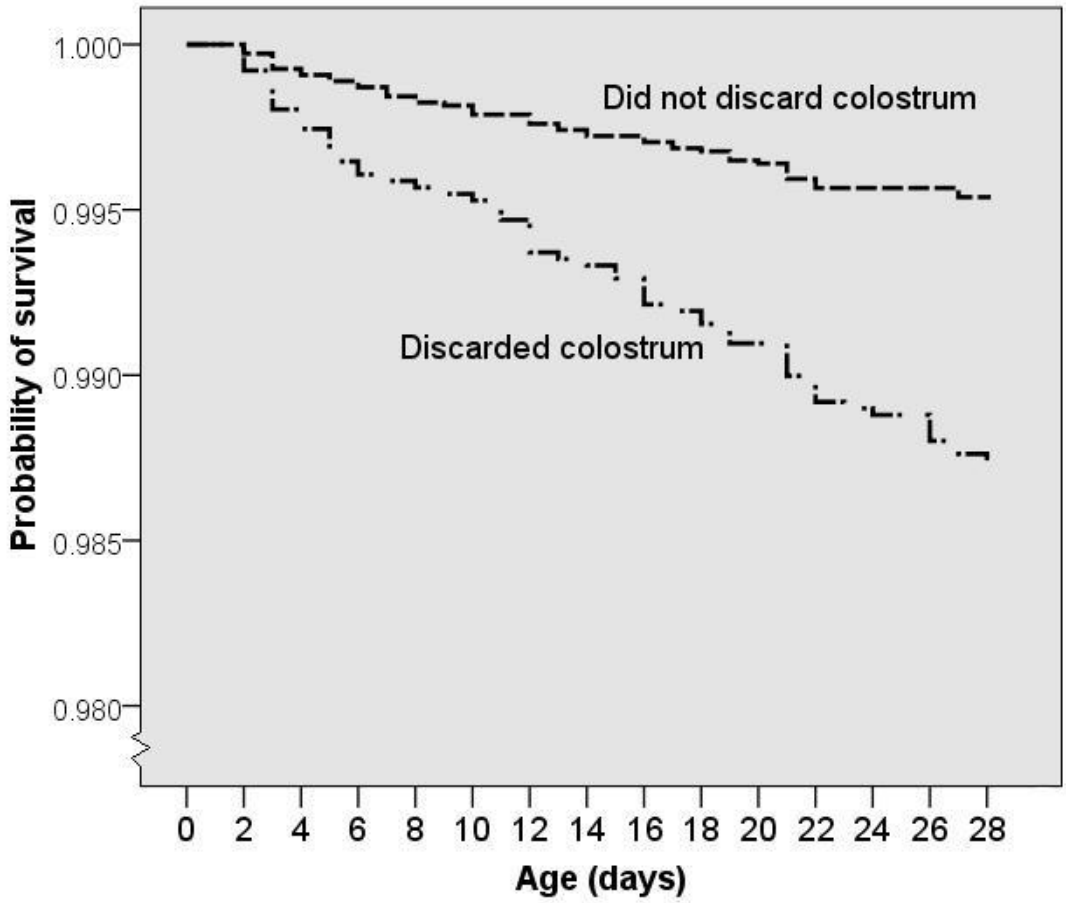
[g] Likelihood ratio test, nesting model 1 in model 4: p=0.136

[h] Population attributable risk calculated as:

100 x [(aOR – 1)/aOR] x [number of deaths in exposed group/overall number of deaths]

Survival curves. Kaplan-Meier survival curves suggest that infants of mothers who discarded colostrum experienced increased mortality risk throughout the neonatal period, compared with infants of mothers who did not discard (Figure 5.8). Both curves display a high probability of neonatal survival (above 98.5%) because the applied exclusion criteria eliminated deaths in the first two days postpartum and the majority of other high risk births.

Figure 5.8: Risk of neonatal mortality by colostrum discarding in singletons born at term who initiated breastfeeding and survived 48 hours (Kaplan-Meier survival curves)



Population attributable risk. Treating aOR4 (Table 5.7) as equivalent to relative risk, the results suggest that 30.4% (95% CI: 17.8% - 38.8%) of neonatal deaths could be averted if all mothers did not discard colostrum, amongst the analysed low-

risk group of singletons born at term who initiated breastfeeding and survived 48 hours. If the PAR calculation is extended to consider all 469 neonatal deaths over the study period, before application of the exclusion criteria, then the revised PAR is 7.6% (95% CI: 4.4% - 9.7%), suggesting that 7.6% of all neonatal deaths in Makwanpur could be avoided if no mothers discarded colostrum. This assumes that deaths that occur, for example, in the first two days postpartum are unaffected by colostrum discarding and have a RR of 1.

Modelling neonatal mortality without colostrum discarding as a term. A fifth model ('model 5') was constructed, identical to model 4 described above (Table 5.7, aOR4), except with the omission of colostrum discarding as a term, to test whether the presence of colostrum discarding as a variable improves model fit. Nesting model 5 in model 4, a likelihood ratio test indicates that a model containing colostrum discarding as a term conveys significantly better fit than one without (p=0.0001).

Goodness-of-fit. A log-likelihood chi-square test was manually performed, since Intercooled Stata version 11 does not permit Hosmer and Lemeshow's or other goodness-of-fit tests following random effects logistic regression modelling. Likelihood ratio tests were also performed comparing full models (including all terms) with a baseline model containing the constant only, to test for significant improvement in fit. For the models displayed in Table 5.7 and all following models in the chapter that show significant findings, these diagnostic tests indicated adequate goodness-of-fit, and are not displayed. As a further check, the models of Table 5.7 were repeated with standard logistic regression, not taking into account clustering, and Hosmer and Lemeshow's goodness-of-fit test continued to indicate that the models fitted the data adequately (p=0.542 for model 4, whereby a p-value of less than 0.05 would suggest a significant divergence between predicted and actual values).

Diagnostic tests for colinearity between covariates in the models were not explicitly performed, although standard errors and confidence interval ranges, in conjunction with preliminary exploration and theoretical understanding of the variables, did not suggest difficulties in this respect.

5.2.2 Primary analysis: Infants surviving the early neonatal period

Analysis was repeated of the association between maternally reported discarding of first breastmilk and neonatal mortality, with the additional criterion of exclusion of all deaths in the early neonatal period. In this smaller group of infants surviving at least seven days, colostrum was discarded for 32% of singletons born at term who initiated breastfeeding (Table 5.8). The late neonatal mortality rate was 9.0 deaths per 1000 live births amongst infants of mothers who reported that they discarded colostrum, compared to 3.5 amongst non-discarders, giving a crude odds ratio of 2.54 (1.65-3.92, p<0.0001).

Table 5.8 displays adjusted odds ratios generated from a progression of random effects logistic regression models as for Table 5.7, the only difference being the additional inclusion criteria whereby infants survived at least seven days. Comparison of Tables 5.7 and 5.8 shows that the distribution of colostrum discarders and non-discarders, and the proportion of deaths in each group, remained approximately constant regardless of whether only deaths in the first two days or all early neonatal deaths were excluded. The adjusted odds ratio for neonatal mortality amongst colostrum discarders compared to non-discarders was 2.21 (95% CI: 1.36 - 3.60) in the context of an initial range of potential confounding variables (aOR1), and remained significant, converging to 2.19 (95% CI: 1.35 - 3.57) after the addition of prelacteal feeding and breastfeeding initiation time as terms in the model (aOR4). Likelihood ratio tests comparing the fit of each model suggested that model 1 had significantly better fit than an unadjusted model with no covariates other than colostrum discarding and neonatal death. The addition of prelacteal feeding as a term (aOR2 and aOR4) conveyed no improvement in model fit over model 1, while the addition of breastfeeding initiation time alone (model 3) conveyed a suggestive but non-significant improvement in fit over model 1 (p=0.079).

Treating aOR4 (Table 5.8) as equivalent to relative risk, the results suggest that 29.5% (95% CI: 14.1% - 39.0%) of neonatal deaths could be averted if all mothers did not discard colostrum, amongst the analysed low-risk group of singletons born at term who initiated breastfeeding and survived 7 days.

The close similarities in results observed after exclusion of deaths in the first two days postpartum (Table 5.7) and the early neonatal period (Table 5.8) suggest that risks associated with colostrum discarding in the early neonatal period compared to the late neonatal period are roughly equal, an hypothesis corroborated by the approximately linear Kaplan-Meier survival curves of Figure 5.8. The similarities in Tables 5.7 and 5.8 also suggest that excluding only infants who died in the first two days postpartum was an adequate safeguard against reverse causality, while allowing for as many cases of mortality as possible to be included in analysis, maximising power.

Table 5.8: Odds of neonatal mortality according to colostrum discarding status in singletons born at term who initiated breastfeeding and survived 7 days

	No. (%) of Neonates	Deaths (%)	Rate, per 1000 live births	aOR1 (95% CI; p)[a]	aOR2 (95% CI; p)[b]	aOR3 (95% CI; p)[c]	aOR4 (95% CI; p)[d]
Colostrum not discarded	10 817 (68.1)	38 (45.8)	3.5	1	1	1	1
Colostrum discarded	5068 (31.9)	45 (54.2)	8.9	2.21 (1.36 – 3.60; p<0.0001)	2.21 (1.36 – 3.60; p<0.0001)	2.19 (1.35 – 3.57; p<0.0001)	2.19 (1.35 – 3.57; p<0.0001)
LRT, p [e]	-	-	-	p=0.0004	p=0.679	- [f]	p=0.889 [g]
PAR, % (95% CI) [h]	-	-	-	-	-	-	29.5 (14.1 - 39.0)
Total	15 885 (100)	83 (100)	5.2				

[a] Odds ratio 1 adjusted for exposure to the women's group intervention, household religion, season of birth, maternal literacy, maternal age, primiparity, previous neonatal death, number of antenatal care visits, home birth, skilled birth attendance, infant sex, date of birth, exclusive breastfeeding, and socioeconomic status

[b] Odds ratio 2 adjusted for all factors listed for aOR1, plus prelacteal feeding

[c] Odds ratio 3 adjusted for all factors listed for aOR1, plus breastfeeding initiation time

[d] Odds ratio 4 adjusted for all factors listed for aOR1, plus prelacteal feeding and breastfeeding initiation time

[e] Likelihood ratio test checks for improvement in model fit, nesting each model in the next; the crude model is nested in model 1 (aOR1), model 1 in model 2 (aOR2), model 2 could not be nested in model 3 because of equality in degrees of freedom, and model 3 is nested in model 4 (aOR4)

[f] Likelihood ratio test, nesting model 1 in model 3: p=0.079

[g] Likelihood ratio test, nesting model 1 in model 4: p=0.213

[h] Population attributable risk calculated as:

100 x [(aOR – 1)/aOR] x [number of deaths in exposed group/overall number of deaths]

5.3 SECONDARY ANALYSES

5.3.1 Discarding of first milk and suspected acute respiratory infection

Analysis was conducted of the association between maternally reported discarding of first breastmilk and suspected ARI, after application of the exclusion criteria described in Figure 5.5. There were a total of 1370 cases of suspected neonatal ARI, giving a rate of 86.1 per 1000 live births (Table 5.9). The rate of suspected neonatal ARI was 105.0 cases per 1000 singleton live births of ever-breastfed infants born at term and surviving to day 2 amongst infants of mothers who reported that they discarded colostrum, compared to 77.2 per 1000 amongst non-discarders, giving a crude odds ratio of 1.40 (1.25-1.57, p<0.0001).

Table 5.9 displays adjusted odds ratios generated from a progression of random effects logistic regression models, comparing risks of suspected neonatal ARI according to colostrum discarding status in singletons born at term who initiated breastfeeding and survived at least 48 hours. The adjusted odds ratio for suspected neonatal ARI amongst colostrum discarders compared to non-discarders is 1.22 (95% CI: 1.07 - 1.39) in the context of a wide range of potential confounding variables (aOR1), and remains the same (95% CI: 1.08 - 1.39) after the addition of prelacteal feeding and breastfeeding initiation time as terms in the model (aOR4).

Likelihood ratio tests comparing the fit of each model suggest that model 1 has significantly better fit than a crude unadjusted model with no covariates other than colostrum discarding and neonatal death. Additional terms (prelacteal feeding and breastfeeding initiation time) convey no significant improvement in fit.

Treating aOR4 (Table 5.9) as equivalent to relative risk, the results suggest that 7% (95% CI: 17.8% - 38.8%) of cases of suspected neonatal ARI could be averted if all mothers did not discard colostrum, amongst the analysed low-risk group of singletons born at term who initiated breastfeeding and survived 48 hours.

Table 5.9: Odds of suspected neonatal ARI according to colostrum discarding status in singletons born at term who initiated breastfeeding and survived 48 hours

	No. (%) of Neonates	Cases of Susp. ARI (%)	Rate, per 1000 live births	aOR1 (95% CI; p)[a]	aOR2 (95% CI; p)[b]	aOR3 (95% CI; p)[c]	aOR4 (95% CI; p)[d]
Colostrum not discarded	10 831 (68.0)	836 (61.0)	77.2	1	1	1	1
Colostrum discarded	5088 (32.0)	534 (39.0)	105.0	1.22 (1.07 – 1.39; p=0.002)	1.22 (1.08 – 1.39; p=0.002)	1.22 (1.08 – 1.39; p=0.002)	1.22 (1.08 – 1.39; p=0.002)
LRT, p [e]	-	-	-	p<0.0001	p=0.246	- [f]	p=0.291 [g]
PAR, % (95% CI) [h]	-	-	-	-	-	-	7.0 (2.9 – 10.9)
Total	15 919 (100)	1370 (100)	86.1				

[a] Odds ratio 1 adjusted for exposure to the women's group intervention, household religion, season of birth, maternal literacy, maternal age, primiparity, previous neonatal death, number of antenatal care visits, home birth, skilled birth attendance, infant sex, date of birth, exclusive breastfeeding, and socioeconomic status

[b] Odds ratio 2 adjusted for all factors listed for aOR1, plus prelacteal feeding

[c] Odds ratio 3 adjusted for all factors listed for aOR1, plus breastfeeding initiation time

[d] Odds ratio 4 adjusted for all factors listed for aOR1, plus prelacteal feeding and breastfeeding initiation time

[e] Likelihood ratio test checks for improvement in model fit, nesting each model in the next; the crude model is nested in model 1 (aOR1), model 1 in model 2 (aOR2), model 2 could not be nested in model 3 because of equality in degrees of freedom, and model 3 is nested in model 4 (aOR4)

[f] Likelihood ratio test, nesting model 1 in model 3: p=0.477

[g] Likelihood ratio test, nesting model 1 in model 4: p=0.445

[h] Population attributable risk calculated as:

100 x [(aOR – 1)/aOR] x [number of cases in exposed group/overall number of cases]

5.3.2 Discarding of first milk and infection-specific neonatal mortality

After application of exclusion criteria, there were 62 deaths attributable to severe infection (Table 5.10). The infection-specific neonatal mortality rate was 2.1 deaths per 1000 singleton live births amongst colostrum non-discarders, and 7.7 deaths per 1000 live births amongst infants of mothers who reported discarding colostrum, giving an unadjusted odds ratio of 3.63 (2.17-6.08, p<0.0001).

The adjusted odds ratio for infection-specific neonatal mortality amongst infants of mothers who discarded colostrum compared to those who did not was 2.54 (95% CI: 1.48 – 4.37) in the context of a wide range of potential confounding variables (aOR1), and became 2.58 (95% CI: 1.50 – 4.43) after the addition of breastfeeding initiation time and prelacteal feeding as terms in the model (aOR4). The findings suggest there is a strong association between colostrum discarding and infection-specific neonatal mortality, after controlling for other dimensions of early infant feeding.

Likelihood ratio tests comparing the fit of each model suggest that model 1 (aOR1) conveys significantly better fit than a model with no covariates other than colostrum discarding and neonatal death. The addition of prelacteal feeding as a term (aOR2) conveys no improvement in model fit over model 1, while the addition of breastfeeding initiation time (aOR3 and aOR4) conveys a significant improvement in fit over model 1 (p=0.003 and p= 0.011 respectively).

Treating aOR4 (Table 5.10) as equivalent to relative risk, the results suggest that 38.5% (95% CI: 21.0% - 48.7%) of infection-specific neonatal deaths could be averted if all mothers did not discard colostrum, amongst the analysed low-risk group of singletons born at term who initiated breastfeeding and survived 48 hours.

Table 5.10: Odds of infection-specific neonatal mortality according to colostrum discarding status in singletons born at term who initiated breastfeeding and survived 48 hours

	No. (%) of Neonates	Infect. specif. deaths (%)	Rate, per 1000 live births	aOR1 (95% CI; p)[a]	aOR2 (95% CI; p)[b]	aOR3 (95% CI; p)[c]	aOR4 (95% CI; p)[d]
Colostrum not discarded	10 831 (68.0)	23 (37.1)	2.1	1	1	1	1
Colostrum discarded	5088 (32.0)	39 (62.9)	7.7	2.54 (1.48 – 4.37; p=0.001)	2.54 (1.48 – 4.37; p=0.001)	2.58 (1.50 – 4.44; p=0.001)	2.58 (1.50 – 4.43; p=0.001)
LRT, p [e]	-	-	-	p<0.0001	p=0.907	- [f]	p=0.673 [g]
PAR, % (95% CI) [h]	-	-	-	-	-	-	38.5 (21.0 - 48.7)
Total	15 919 (100)	62 (100)	3.9				

[a] Odds ratio 1 adjusted for exposure to the women's group intervention, household religion, season of birth, maternal literacy, maternal age, primiparity, previous neonatal death, number of antenatal care visits, home birth, skilled birth attendance, infant sex, date of birth, exclusive breastfeeding, and socioeconomic status

[b] Odds ratio 2 adjusted for all factors listed for aOR1, plus prelacteal feeding

[c] Odds ratio 3 adjusted for all factors listed for aOR1, plus breastfeeding initiation time

[d] Odds ratio 4 adjusted for all factors listed for aOR1, plus prelacteal feeding and breastfeeding initiation time

[e] Likelihood ratio test checks for improvement in model fit, nesting each model in the next; the crude model is nested in model 1 (aOR1), model 1 in model 2 (aOR2), model 2 could not be nested in model 3 because of equality in degrees of freedom, and model 3 is nested in model 4 (aOR4)

[f] Likelihood ratio test, nesting model 1 in model 3: p=0.003

[g] Likelihood ratio test, nesting model 1 in model 4: p=0.011

[h] Population attributable risk calculated as:

100 x [(aOR – 1)/aOR] x [number of deaths in exposed group/overall number of deaths]

5.3.3 Prelacteal feeding and all-cause neonatal mortality

Analysis of the association between maternally reported prelacteal feeding and all-cause neonatal mortality was conducted, after application of the exclusion criteria described in Figure 5.5. Prelacteal feeds were given to 9% of singletons born at term who initiated breastfeeding and survived 48 hours (Table 5.11). The neonatal mortality rate was 4.8 deaths per 1000 live births amongst infants of mothers who reported that they gave prelacteal feeds, compared to 7.6 amongst those who did not, giving an unadjusted odds ratio of 0.64 (0.30-1.37, p=0.245).

Table 5.11 displays adjusted odds ratios generated from a progression of random effects logistic regression models as described in Section 3.9, comparing risks of neonatal mortality by prelacteal feeding in singletons born at term who initiated breastfeeding and survived at least 48 hours. The adjusted odds ratio for neonatal mortality amongst infants given prelacteal feeds compared to those not given prelacteal feeds was 0.80 (95% CI: 0.35 – 1.85) in the context of a wide range of potential confounding variables (aOR1), and converged to 0.70 (95% CI: 0.30 – 1.64) after the addition of colostrum discarding and breastfeeding initiation time as terms in the model (aOR4). The findings do not suggest an association between prelacteal feeding and neonatal mortality. PAR is not expressed because of non-significant odds ratios.

Likelihood ratio tests comparing the fit of each model suggest that model 1 conveys significantly better fit than a model with no covariates other than prelacteal feeding and neonatal death. The addition of colostrum discarding as a term (aOR2 and aOR4) conveys a significant improvement in fit over model 1, while the addition of breastfeeding initiation time alone (model 3) conveys a suggestive but marginally non-significant improvement in fit over model 1 (p=0.053).

Table 5.11: Odds of neonatal mortality according to prelacteal feeding status in singletons born at term who initiated breastfeeding and survived 48 hours

	No. (%) of Neonates	Deaths (%)	Rate, per 1000 live births	aOR1 (95% CI; p)[a]	aOR2 (95% CI; p)[b]	aOR3 (95% CI; p)[c]	aOR4 (95% CI; p)[d]
No prelacteal feeding	14 472 (90.9)	110 (94.0)	7.6	1	1	1	1
Prelacteal feeding	1447 (9.1)	7 (6.0)	4.8	0.80 (0.35 – 1.85; p=0.603)	0.81 (0.35 – 1.87; p=0.618)	0.69 (0.30 – 1.62; p=0.399)	0.70 (0.30 – 1.64; p=0.413)
LRT, p [e]	-	-	-	p<0.0001	p=0.0001	- [f]	p=0.0001 [g]
Total	15 919 (100)	117 (100)	7.3				

[a] Odds ratio 1 adjusted for exposure to the women's group intervention, household religion, season of birth, maternal literacy, maternal age, primiparity, previous neonatal death, number of antenatal care visits, home birth, skilled birth attendance, infant sex, date of birth, exclusive breastfeeding, and socioeconomic status

[b] Odds ratio 2 adjusted for all factors listed for aOR1, plus colostrum discarding

[c] Odds ratio 3 adjusted for all factors listed for aOR1, plus breastfeeding initiation time

[d] Odds ratio 4 adjusted for all factors listed for aOR1, plus colostrum discarding and breastfeeding initiation time

[e] Likelihood ratio test checks for improvement in model fit, nesting each model in the next; the crude model is nested in model 1 (aOR1), model 1 in model 2 (aOR2), model 2 could not be nested in model 3 because of equality in degrees of freedom, and model 3 is nested in model 4 (aOR4)

[f] Likelihood ratio test, nesting model 1 in model 3: p=0.053

[g] Likelihood ratio test, nesting model 1 in model 4: p=0.0001

5.3.4 Breastfeeding initiation time and all-cause neonatal mortality

Comparison of early (≤24 hours) and late (>24 hours) breastfeeding initiators. Breastfeeding was initiated early for 96.5% of singletons born at term who initiated breastfeeding and survived 48 hours (Table 5.12). The neonatal mortality rate was 7.1 deaths per 1000 live births amongst infants of mothers who reported that they initiated within 24 hours, compared to 14.5 amongst those who did not, giving a crude odds ratio of 2.06 (1.00-4.23, p=0.051).

Table 5.12 displays adjusted odds ratios generated from a progression of random effects logistic regression models as described in Section 3.9, comparing risks of neonatal mortality by early or late breastfeeding initiation time in singletons born at term who initiated breastfeeding and survived at least 48 hours. The adjusted odds ratio for neonatal mortality amongst late compared to early initiators is 2.12 (95% CI: 1.01 – 4.46) in the context of a wide range of potential confounding variables (aOR1), and becomes 2.28 (95% CI: 1.07 – 4.88) after the addition of colostrum discarding and prelacteal feeding as terms in the model (aOR4). The findings suggest there is a significant association between breastfeeding initiation time and neonatal mortality risk, although the adjusted odds ratios are wide and nearly overlap with 1.0 because few infants initiated breastfeeding after 24 hours.

Likelihood ratio tests comparing the fit of each model suggest that model 1 conveys significantly better fit than a crude unadjusted model with no covariates other than breastfeeding initiation time and neonatal death. The addition of colostrum discarding as a term (aOR2 and aOR4) conveys a highly significant improvement in fit over model 1 (p=0.0001 and p=0.0003 respectively), while the addition of prelacteal feeding alone (model 3) conveys no improvement in fit over model 1.

Treating aOR4 as equivalent to relative risk, the results suggest that 3.8% (95% CI: 0.4% - 5.4%) of neonatal deaths could be averted in Makwanpur if all mothers initiated breastfeeding early, amongst the analysed low-risk group of singletons born at term who initiated breastfeeding and survived 48 hours. The low PAR reflects the

fact that few infants initiated after 24 hours, and not necessarily that late initiation has a small influence on neonatal mortality.

Table 5.12: Odds of neonatal mortality by early (≤ 24 hours) and late (> 24 hours) breastfeeding initiation time in singletons born at term who initiated breastfeeding and survived 48 hours

Initiation of breast-feeding	No. (%) of Neonates	Deaths (%)	Rate, per 1000 live births	aOR1 (95% CI; p)[a]	aOR2 (95% CI; p)[b]	aOR3 (95% CI; p)[c]	aOR4 (95% CI; p)[d]
Early initiation (≤ 24 hours)	15 366 (96.5)	109 (93.2)	7.1	1	1	1	1
Late initiation (> 24 hours)	553 (3.5)	8 (6.8)	14.5	2.12 (1.01 – 4.46; p=0.045)	2.13 (1.01 – 4.51; p=0.047)	2.28 (1.07 – 4.85; p=0.033)	2.28 (1.07 – 4.88; p=0.033)
LRT, p [e]	-	-	-	p<0.0001	p=0.0001	- [f]	p=0.0001 [g]
PAR, % (95% CI) [h]	-	-	-	-	-	-	3.8 (0.4 – 5.4)
Total	15 919 (100)	117 (100)	7.3				

[a] Odds ratio 1 adjusted for exposure to the women's group intervention, household religion, season of birth, maternal literacy, maternal age, primiparity, previous neonatal death, number of antenatal care visits, home birth, skilled birth attendance, infant sex, date of birth, exclusive breastfeeding, and socioeconomic status

[b] Odds ratio 2 adjusted for all factors listed for aOR1, plus colostrum discarding

[c] Odds ratio 3 adjusted for all factors listed for aOR1, plus prelacteal feeding

[d] Odds ratio 4 adjusted for all factors listed for aOR1, plus colostrum discarding and prelacteal feeding

[e] Likelihood ratio test checks for improvement in model fit, nesting each model in the next; the crude model is nested in model 1 (aOR1), model 1 in model 2 (aOR2), model 2 could not be nested in model 3 because of equality in degrees of freedom, and model 3 is nested in model 4 (aOR4)

[f] Likelihood ratio test, nesting model 1 in model 3: p=0.383

[g] Likelihood ratio test, nesting model 1 in model 4: p=0.0003

[h] Population attributable risk calculated as:

100 x [(aOR – 1)/aOR] x [number of deaths in exposed group/overall number of deaths]

Comparison of further breastfeeding initiation time categories. Breastfeeding initiation time was also categorised by initiation within 1 hour, within 24 hours but after the first hour, on day 2, day 3, or after day 3. Table 5.13 displays the proportions of infants initiating within each category, as well as neonatal mortality rates for each group. The categories of 'day 3' and 'after day 3' have been merged in the results table in this instance (forming a joint category 'after day 2') because there were no deaths amongst infants initiating after day 3. Of the sample of 15 919 infants, 62.1% initiated within one hour, 34.4% initiated after one hour but within one day, 1.5% initiated on the second day, 1.5% initiated on the third day, and 0.5% initiated after day three. Treating 'within one hour' as the reference category, the unadjusted odds ratios for mortality in each subsequent group were 0.89 (95% CI: 0.60 – 1.33), 1.72 (95% CI: 0.54 – 5.49), and 2.17 (95% CI: 0.87 – 5.40) respectively, treating those who initiated on the third day and after the third day as one group.

Table 5.13 displays adjusted odds ratios generated from a progression of random effects logistic regression models as described in Section 3.9, comparing risks of neonatal mortality by breastfeeding initiation category in singletons born at term who initiated breastfeeding and survived at least 48 hours. All breastfeeding initiation categories after 1 hour in all four adjusted models display a non-significant association with neonatal mortality, regardless of the combination of potential confounding variables controlled for. Mantel-Haenszel tests for trend were also non-significant in all instances. Although the null hypothesis (that breastfeeding initiation time has no effect on neonatal mortality) cannot be rejected on the basis of these results, they are also not incongruent with there being a dose-response trend – non-significant results are observed because so few infants initiated breastfeeding after 24 hours, and not necessarily because there was no progressive effect of delayed breastfeeding initiation.

Likelihood ratio tests comparing the fit of each model suggest that model 1 conveys significantly better fit than a model with no covariates other than breastfeeding initiation time and neonatal death. The addition of colostrum discarding as a term (aOR2 and aOR4) conveys a highly significant improvement in fit over model 1 ($p=0.0001$ and $p=0.0003$ respectively), while the addition of prelacteal feeding alone (model 3) conveys no improvement in fit over model 1.

Table 5.13: Odds of neonatal mortality by breastfeeding initiation time category in singletons born at term who initiated breastfeeding and survived 48 hours

Initiation of breast-feeding	No. (%) of Neonates	Deaths (%)	Rate, per 1000 live births	aOR1 (95% CI; p)[a]	aOR2 (95% CI; p)[b]	aOR3 (95% CI; p)[c]	aOR4 (95% CI; p)[d]
Within 1h	9887 (62.1)	73 (62.4)	7.4	1	1	1	1
From 1h to end day 1	5479 (34.4)	36 (30.8)	6.6	0.80 (0.53 – 1.22; p=0.303)	0.79 (0.52 – 1.20; p=0.273)	0.81 (0.54 – 1.23; p=0.331)	0.80 (0.52 – 1.22; p=0.299)
Day 2	238 (1.5)	3 (2.6)	12.6	1.69 (0.52 – 5.48; p=0.384)	1.72 (0.53 – 5.61; p=0.369)	1.80 (0.55 – 5.87; p=0.332)	1.83 (0.56 – 6.00; p=0.321)
After day 2	315 (2.0)	5 (4.3)	15.9	2.16 (0.84 – 5.54; p=0.109)	2.11 (0.82 – 5.48; p=0.122)	2.33 (0.90 – 6.07; p=0.082)	2.28 (0.87 – 5.97; p=0.095)
LRT, p [e]	-	-	-	p<0.0001	p=0.0001	- [f]	p=0.0001 [g]
Mantel-Haenszel test for trend	-	-	-	p=0.317	p=0.317	p=0.317	p=0.317
Total	15 919 (100)	117 (100)	7.3				

[a] Odds ratio 1 adjusted for same variables as aOR1 in Table 5.12

[b] Odds ratio 2 adjusted for all factors listed for aOR1, plus colostrum discarding

[c] Odds ratio 3 adjusted for all factors listed for aOR1, plus prelacteal feeding

[d] Odds ratio 4 adjusted for all factors listed for aOR1, plus colostrum discarding and prelacteal feeding

[e] Likelihood ratio test checks for improvement in model fit, nesting each model in the next; the crude model is nested in model 1 (aOR1), model 1 in model 2 (aOR2), model 2 could not be nested in model 3 because of equality in degrees of freedom, and model 3 is nested in model 4 (aOR4)

[f] Likelihood ratio test, nesting model 1 in model 3: p=0.417

[g] Likelihood ratio test, nesting model 1 in model 4: p=0.0003

5.3.5 Exclusive breastfeeding and all-cause neonatal mortality

Analysis of the association between maternally reported non-exclusive breastfeeding and all-cause neonatal mortality was conducted. However, analysis was restricted to infants for whom interview was conducted after four completed weeks postpartum but before seven weeks. This decision was made because of concerns about the distribution of interview times (Figure 5.1), in conjunction with the fact that mothers were asked “at the moment, are you feeding the baby only mother's milk or are you giving some other things like water, lactogen or cow or buffalo milk as well?” as the data source from which to estimate exclusive breastfeeding at one month postpartum. Since approximately half of interviews were taken at over nine weeks postpartum, analysis of the full dataset from Makwanpur would describe the effect of exclusive breastfeeding over a loosely defined range of postpartum periods that spans several months, which is not instructive and which was not an objective of the thesis.

There were 5172 singletons born at term who initiated breastfeeding and survived 48 hours, whose mothers were interviewed between four and seven weeks postpartum. Of these, 94% were exclusively breastfed, and 6% were non-exclusively breastfed (Table 5.14). The neonatal mortality rate was 6.0 deaths per 1000 live births amongst infants of mothers who reported that they exclusively breastfed, and 16.3 amongst those non-exclusively breastfeeding, giving a crude odds ratio of 2.77 (1.07-7.21, p=0.037).

Only one adjusted model is presented in this instance. I was interested in the effect of exclusive breastfeeding in the context of colostrum discarding, prelacteal feeding and breastfeeding initiation time as covariates in a model, and it was not deemed necessary to disambiguate the effect of incrementally introducing these dimensions of early infant feeding as terms in separate models. The adjusted odds ratio for neonatal mortality amongst infants non-exclusively breastfed compared to those exclusively breastfed increased to 4.47 (95% CI: 1.56 – 12.76) in the context of a wide range of potential confounding variables (Table 5.14), including colostrum discarding, breastfeeding initiation time and prelacteal feeding.

The results suggest that 11.4% (95% CI: 5.3% - 13.6%) of neonatal deaths in Makwanpur could be averted if all mothers exclusively breastfed, amongst the analysed low-risk group of singletons born at term who initiated breastfeeding and survived 48 hours.

Table 5.14: Odds of neonatal mortality by exclusive and non-exclusive breastfeeding in singletons born at term who initiated breastfeeding and survived 48 hours, restricted to infants interviewed between four and seven completed weeks postpartum (n = 5172)

	No. (%) of Neonates	Deaths (%)	Rate, per 1000 live births	Crude OR (95% CI; p)	aOR (95% CI; p)[a]
Exclusive feeding	4866 (94.1)	29 (85.3)	6.0	1	1
Non-exclusive feeding	306 (5.9)	5 (14.7)	16.3	2.77 (1.07 – 7.21; p=0.037)	4.47 (1.56 – 12.76; p=0.005)
PAR, % (95% CI) [b]	-	-	-	-	11.4 (5.3 – 13.6)
Total	5172 (100)	34 (100)	6.6		

[a] Odds ratio adjusted for exposure to the women's group intervention, household religion, season of birth, maternal literacy, maternal age, primiparity, previous neonatal death, number of antenatal care visits, home birth, skilled birth attendance, infant sex, date of birth, exclusive breastfeeding, socioeconomic status, colostrum discarding, breastfeeding initiation time, and prelacteal feeding

[b] Population attributable risk calculated as:

100 x [(aOR – 1)/aOR] x [number of deaths in exposed group/overall number of deaths]

Despite concerns over the distribution of interview times postpartum, and the wording of the question to establish exclusive breastfeeding, the decision was made to adjust for the exclusive breastfeeding variable in all other models presented in this chapter, that consider the entire Makwanpur dataset regardless of interview timing. This decision was made because exclusive breastfeeding does represent a genuine potential confounder, and adjusting for the available information was deemed to provide a more favourable alternative over not adjusting for exclusive breastfeeding at all.

5.3.6 Risk factor analysis of covariates predicting colostrum discarding

In univariable analyses, incidence of colostrum discarding was at least suggestively correlated ($p<0.10$) with a wide range of possible factors related to mother's ethnicity and status, birth attendance and perinatal events and environment, timing of birth, and other dimensions of early infant feeding, including multiple interaction effects between pairs of variables. A notable exception was sex of the newborn infant, which was not associated with colostrum discarding risk.

Table 5.15 displays variables associated with colostrum discarding ($p<0.05$) and adjusted odds ratios for colostrum discarding when all terms are considered in an adjusted model. Of 23 variables suggestively correlated with colostrum discarding in univariable analyses, 11 covariates remained significantly associated when included in multivariable random effects logistic regression analysis. No higher interaction terms remained significantly associated with colostrum discarding in the multivariable model; the model presented in Table 5.15 contains no significant interaction effects between pairs of covariates, and higher-order interaction effects (between three or more variables simultaneously) were not tested for.

The following terms were associated with colostrum discarding in univariable logistic regression analyses but not in the multivariable adjusted model: breastfeeding

initiation time, prelacteal feeding, extent of exposure to the women's group intervention, maternal age, season of birth, religion, tetanus toxoid injection during pregnancy, birth delivery method, the part of the infant born first, birth location, and room heating at delivery. In particular, it is likely that religion no longer remained significant in the multivariable model because of its colinearity with ethnicity, which remained significant.

Of the variables found to be significantly associated with colostrum discarding risk, three were positively associated and eight were negatively associated (Table 5.15): Tamang ethnicity, a long labour, and a previous neonatal death were all associated with increased risk of maternally reported discarding of first milk, whereas literacy, increased wealth score, later age at marriage, later date of infant birth (corroborated by Figure 5.4), more antenatal care visits, skilled or traditional birth attendance, and having had any previous pregnancy were all associated with decreased risk of maternally reported discarding of first milk.

Table 5.15: Variables associated with colostrum discarding in mother-infant pairs who initiated breastfeeding, with adjusted odds ratios (n = 17 245)

Risk factor (measurement unit)	No. (%) of mothers or infants exposed	No. (%) discarding colostrum amongst exposed	aOR (per unit increase)	95% CI	p	Positive (+) / negative (-) association with colostrum discarding
Tamang ethnicity	11 063 (64.2)	4154 (37.5)	1.36	1.14-1.62	0.001	+
Literacy	6805 (39.5)	1585 (23.3)	0.63	0.57-0.68	<0.0001	_
PCA wealth score (standard deviations from mean)	Mean (SD): 0 (1)	N/A	0.84	0.80-0.88	<0.0001	_
Age at marriage (years)	Mean (SD): 26.6 (6.5)	N/A	0.983 (per year)	0.969-0.998	0.024	_
Date of birth (days)	N/A	N/A	0.9999 (per day)	0.9998-0.9999	0.001	_
Antenatal care (number of visits)	Mean (SD): 2.4 (1.7)	N/A	0.94	0.91-0.96	<0.0001	_
Labour lasted more than 24 hours	2597 (15.1)	899 (34.6)	1.17	1.05-1.30	0.004	+
Skilled birth attendance	1643 (9.5)	272 (4.9)	0.66	0.53-0.82	<0.0001	_
Birth attended by traditional birth attendant	881 (5.1)	157 (17.8)	0.69	0.57-0.85	<0.0001	_
Previous pregnancy	7184 (41.7)	2270 (31.6)	0.79	0.72-0.88	<0.0001	_
Previous neonatal death	1131 (6.6)	447 (39.5)	1.22	1.06-1.40	0.005	+
Total	17 245	5592 (32.4)				

The findings from analyses presented for Makwanpur can be summarised as follows:

- *Discarding of first milk more than doubled the odds of neonatal mortality in singletons born at term who initiated breastfeeding and survived 48 hours. The association was robust to adjustment for a range of potentially confounding variables including other dimensions of early infant feeding (Table 5.7), and after exclusion of infants dying within the early neonatal period (Table 5.8).*
- *Similarly, discarding of first milk more than doubled the odds of infection-specific neonatal mortality (Table 5.10), and was associated with increased odds of developing suspected ARI (Table 5.9), after adjustment for confounding variables.*
- *When aggregated by early (≤24h) or late (>24h) timing, late breastfeeding initiation was associated with a more than two-fold increased odds of neonatal mortality (Table 5.12). No significant associations or trends remained after disaggregation to narrower breastfeeding initiation timing categories (Table 5.13), although this is likely to be because few infants initiated after the first 24 hours postpartum.*
- *There was no significant or suggestive association between prelacteal feeding and neonatal mortality risk (Table 5.11).*
- *Non-exclusive breastfeeding was associated with an over four-fold increase in the odds of neonatal mortality, after adjustment for confounding variables that included dimensions of early infant feeding (Table 5.14).*
- *In general across the analyses, addition of colostrum feeding as a term in models tended to significantly improve model fit, addition of breastfeeding initiation time tended to marginally improve fit, and addition of prelacteal feeding did not improve fit.*
- *Risk factors for colostrum discarding included ethnicity, maternal wealth and literacy, antenatal care, birth attendance, and previous pregnancy*

events. Factors not found to be associated with discarding included infant sex, other dimensions of early infant feeding, and exposure to the women's group intervention (Table 5.15).

- *There was no strong correlation or colinearity between breastfeeding initiation time and maternally reported discarding of breastmilk, and they may be treated as separate dimensions (Table 5.5).*

I discuss interpretation of these results in Chapter 8, in the context of further avenues of evidence presented in the thesis.

CHAPTER 6: QUANTITATIVE RESULTS - DHANUSHA

In Chapter 3 I described the setting of the MIRA Dhanusha factorial trial of community-based interventions, its surveillance system, and quantitative methods adopted to examine the association of a number of early infant feeding exposures with neonatal outcomes.

Data on 17 321 married women of reproductive age and their newborn infants were collected from September 17 2006 to April 10 2008, of which 706 were neonatal deaths, giving a neonatal mortality rate of 40.8 per 1000 live births. The results of the analyses based upon these data are presented in this chapter. After application of exclusion criteria, there were a total of 14 991 singleton infants born at term without abnormalities, who survived two days and initiated breastfeeding, of whom 346 died within the neonatal period (174 in the early neonatal period), giving a neonatal mortality rate of 23.1 per 1000 live births. There were no refusals to participate.

The primary objective of the analyses in this chapter is to examine the association between maternally reported discarding of first breastmilk and neonatal mortality in Dhanusha. Secondary objectives are to: (i) examine any association between discarding of first milk and suspected acute respiratory infection (ARI); (ii) analyse risk of infection-specific neonatal mortality and hypothermia-specific neonatal mortality by first milk discarding status, based on categorisation derived from verbal autopsy data; (iii) clarify any relationship between prelacteal feeding and neonatal mortality; (iv) replicate previous analyses of breastfeeding initiation time and neonatal mortality; (v) replicate previous analyses of established breastfeeding patterns (exclusive and non-exclusive breastfeeding) and neonatal mortality; and (vi) explore characteristics predicting the discarding of first milk as a risk-factor analysis.

I first present a descriptive overview of the data from Dhanusha, and then in

turn address each of the thesis objectives relating to quantitative methods. In each instance, a summary of the findings is accompanied by basic interpretation. The chapter concludes with a general summary.

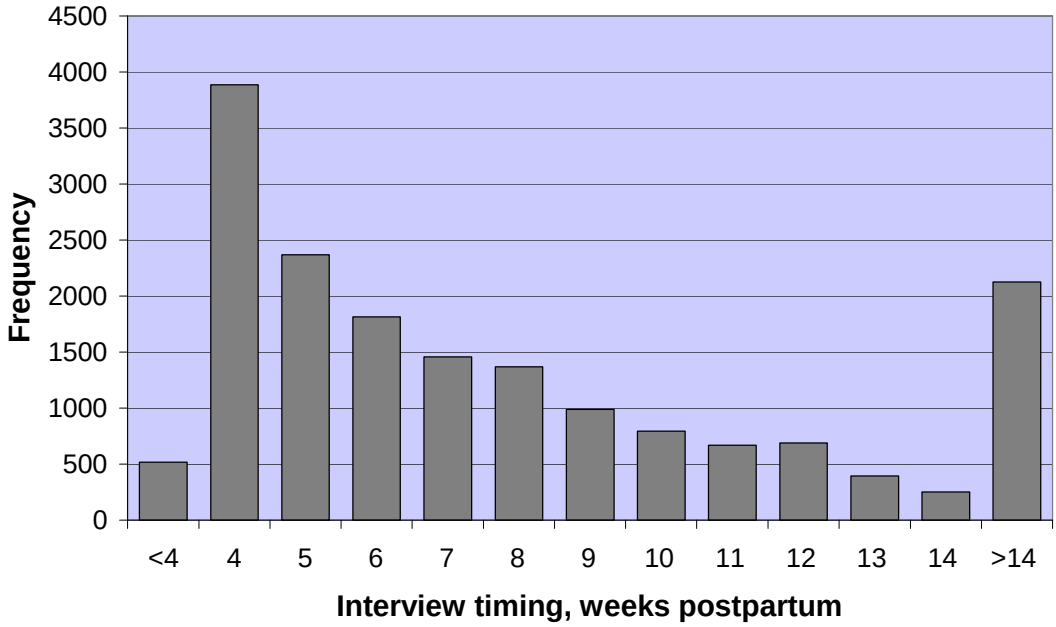
6.1 HOUSEHOLD AND PARTICIPANT CHARACTERISTICS

Unless otherwise stated, the following descriptive statistics refer to all 17 321 live and stillbirths, and not only those infants meeting analysis inclusion criteria. In general, where mortality data or comparison of participants who did or did not discard colostrum are presented, findings are for the study sample after application of the exclusion criteria, whereas the entire sample is included when other population characteristics are described.

6.1.1 Timing of interviews

The median week of interview after birth was six weeks, with an interquartile range of 4-9 weeks (Figure 6.1). The most common week of interview was four completed weeks after birth (28-34 days postpartum). 516 interviews (3%) were conducted earlier than 28 days postpartum. 2127 interviews (12%) were conducted after 14 weeks due to local ethnic and political conflict and seasonal migration of mothers. As a result, data and analyses from Dhanusha must be interpreted judiciously, since responses rely on maternal recall of the neonatal period, and specific questions such as “what have you fed your baby in the past week?” decline in applicability to any one time period.

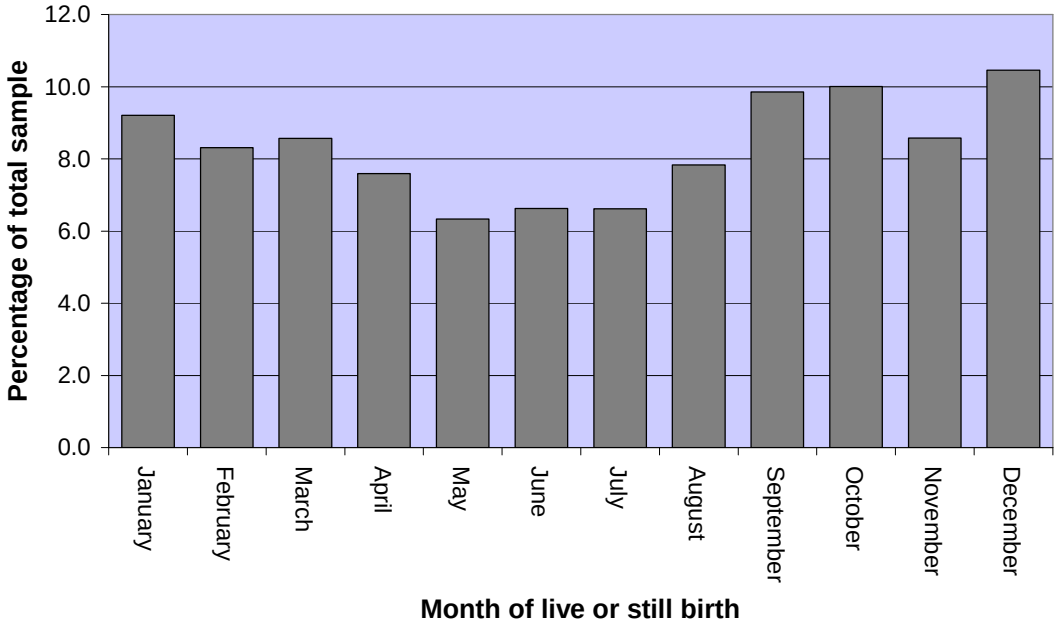
Figure 6.1: Timing of field interviewer visit after birth, completed weeks postpartum (n = 17 321)



6.1.2 Month of live and still births

The distribution of live and stillbirths showed a degree of seasonality (Figure 6.2). When considering data collected in the one full year from January 2007 to December 2007, there were notably fewer events in May, June and July compared to the rest of the year. This may be due to seasonality in pregnancies – it is notable that there are specific marriage seasons which fall nine months prior to the peaks of Figure 6.2 – or bias in the recording of the date on forms, since this information was missing for 2127 cases in 2007 (none of which were neonatal deaths). The profile of infant month of birth was comparable for mothers who did or did not discard colostrum, and also showed no difference between infants who met or did not meet the inclusion criteria.

Figure 6.2: Month of live births and stillbirths, January 2007 to December 2007 inclusive (n = 10 364) [a] [b]



[a] Date of birth or still birth was not recorded for 2127 cases in the year 2007

[b] Data are considered for one complete year, January 2007 to December 2007, as opposed to the entire dataset, so that each month is equally represented

6.1.3 Household and participant characteristics: Overall

Table 6.1 shows a range of household and participant characteristics of the study sample. Comparison by colostrum discarding status is presented later.

Table 6.1: Study sample household and participant characteristics, Dhanusha (n = 17 321)

Characteristic	Number (%)
Maternal Status	
Basic or higher literacy [a]	4019 (24.6)
Maternal Religion	
Buddhist	94 (0.5)
Hindu	14 846 (85.7)
Muslim (ethnicity and religion)	1899 (11.0)
Maternal Ethnicity / Caste	
Dalit (lower class, multiple ethnicities) [b]	**4062 (23.5) [f]**
Madeshi (plains) caste grouping, [c] *of which:*	**13619 (78.6) [f]**
Yadav	*3056 (17.6)*
Mandal	*2323 (13.4)*
Sudi / Teli	*1738 (10.0)*
Maternal Demographic Characteristics	
Mother's age at delivery in years: Mean (SD)	Mean 23.5 (SD 5.0)
Mother had previous pregnancy [d]	10 274 (59.3)
Previous pregnancy resulted in neonatal mortality	1696 (9.8)
Breastfeeding Practices	
Given prelacteal feeds	6814 (39.3)
Initiated early (≤24 hours)	5265 (31.0)
Discarded colostrum [e]	6298 (37.1)
Exclusively breastfed after one month [e]	14 939 (88.1)
Infant Characteristics	
Female infant sex	8235 (47.5)
Health System and Birth Environment	
Mother received any antenatal care	10 745 (62.0)
Birth assisted by skilled birth attendant (doctor, nurse, health assistant or auxiliary nurse midwife)	3189 (18.4)
Birth assisted by traditional birth attendant	4606 (26.6)
Birthplace at home	14 368 (83.0)
Residence in VDC Receiving Women's Group or FCHV Training Intervention (not intention-to-treat)	
Women's group	8307 (48.0)
FCHV training	6286 (36.3)
Total	**17 321 (100)**

[a] Excludes consideration of 963 mothers where literacy data were absent

[b] Includes some Madeshi (plains) subcastes and some Pahadi (hills) subcastes

[c] Includes Yadav, Mandal, Sudi / Teli, Muslims, and some types of Dalit, plus further less frequently occurring ethnic / caste groups but does not include castes that were classified as 'other'

[d] Excludes consideration of 718 mothers where previous pregnancy data were absent

[e] Excludes consideration of 364 mothers who did not initiate breastfeeding

[f] Total percentage of displayed ethnicities/caste groupings exceeds 100% because several Dalit subcastes also fall under the Madeshi ethnic/caste grouping

6.1.4 Causes of neonatal death

Of the 706 neonatal deaths in the study period, cause of death was classified for 687 cases (326 after exclusion criteria were applied). Table 6.2 indicates that before application of analysis exclusion criteria, causes of death related to asphyxia accounted for over a third of neonatal deaths (37%), followed by infection (31%), and prematurity (12%). After application of the exclusion criteria, severe infection accounted for the largest single category of deaths (50%), broadly in agreement with what was observed in Makwanpur. The profile of causes of death was comparable for infants of mothers who did and did not report colostrum discarding, although the proportion of infants dying from infectious causes appeared to be higher amongst colostrum discarders than non-discarders, while the proportion dying from asphyxia was lower amongst discarders (Table 6.2).

There was a gradient in the causes of neonatal death as day of death advanced (Table 6.3). In the days immediately following birth, asphyxia and birth trauma accounted for most deaths (59% of deaths in the first 72 hours after birth), whereas severe infection accounted for most late neonatal deaths (60%). As was the case for Makwanpur, the findings suggest that the exclusion criteria are adequate in limiting analysis primarily to types of neonatal death potentially influenced by early infant feeding practices, since the majority of deaths attributed to asphyxia, obstetric complications, congenital abnormality and prematurity are removed by excluding from analysis infants who died in the first two days of life, even before further exclusion criteria are applied.

Table 6.2: Neonatal death classifications: Before exclusion criteria (n = 687), after exclusion criteria (n = 326), and compared by colostrum discarding after application of exclusion criteria

Figures are n (%)	**Before application of exclusion criteria**	**After application of exclusion criteria**		
Cause of death	**Overall (n = 687)**	**Overall (n = 326)**	**Discarded colostrum (n = 150)**	**Did not discard colostrum (n = 176)**
Asphyxia / asphyxia with obstetric complications	255 (37.1)	47 (14.4)	17 (11.3)	30 (17.0)
Severe infection	210 (30.6)	164 (50.3)	83 (55.3)	81 (46.0)
Prematurity	83 (12.1)	29 (8.9)	14 (9.3)	15 (8.5)
Hypothermia	47 (6.8)	27 (8.3)	14 (9.3)	13 (7.4)
Congenital anomaly	6 (0.9)	3 (0.9)	0 (0)	3 (1.7)
Low birth weight	23 (3.3)	13 (4.0)	4 (2.7)	9 (5.1)
Other	33 (4.8)	17 (5.2)	7 (4.7)	10 (5.7)
Unclassifiable	30 (4.4)	26 (8.0)	11 (7.3)	15 (8.5)
Total deaths	**687 (100)**	**326 (100)**	**150 (100)**	**176 (100)**

Table 6.3: Causes of death by day of death, before exclusion criteria (n = 687) [a]

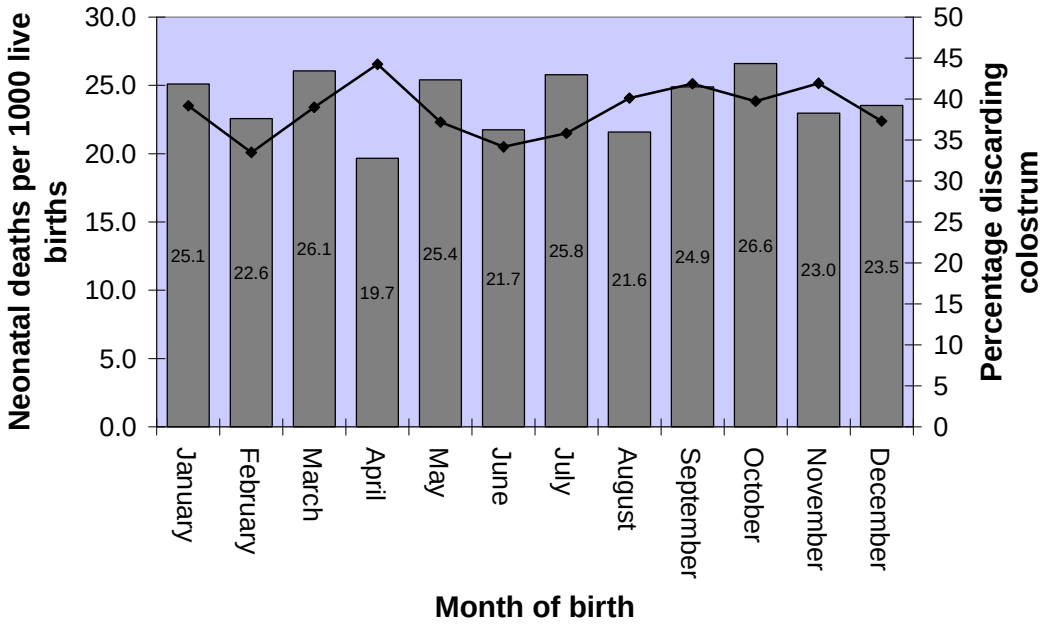
Figures are n (%)		Days of survival (where 0 is death on day of birth)						
		0	**1**	**2**	**3 to 6**	**7 to 13**	**14 to 20**	**21 to 27**
Neonatal death classification	Asphyxia / asphyxia with obstetric complication	138 (66.7)	44 (56.4)	19 (32.8)	38 (22.5)	11 (14.1)	0 (0)	4 (8.0)
	Severe infection	11 (5.3)	10 (12.8)	20 (34.5)	67 (39.6)	49 (62.8)	26 (61.9)	27 (54.0)
	Prematurity	35 (16.9)	10 (12.8)	7 (12.1)	18 (10.7)	2 (2.6)	4 (9.5)	3 (6.0)
	Hypothermia	8 (3.9)	8 (10.3)	7 (12.1)	11 (6.5)	3 (3.8)	5 (11.9)	5 (10.0)
	Congenital anomaly	3 (1.4)	0 (0)	0 (0)	2 (1.2)	0 (0)	0 (0)	1 (2.0)
	Low birth weight	4 (1.9)	1 (1.3)	1 (1.7)	11 (6.5)	4 (5.1)	1 (2.4)	1 (2.0)
	Other	8 (3.9)	3 (3.8)	1 (1.7)	11 (6.5)	3 (3.8)	3 (7.1)	4 (8.0)
	Unclassifiable	0 (0)	2 (2.6)	3 (5.2)	11 (6.5)	6 (7.7)	3 (7.1)	5 (10.0)
Total deaths		**207 (100)**	**78 (100)**	**58 (100)**	**169 (100)**	**78 (100)**	**42 (100)**	**50 (100)**

[a] Day of death unknown for five cases

6.1.5 Seasonality of neonatal mortality and colostrum discarding

Neonatal mortality remained approximately constant across different months after application of the exclusion criteria (Figure 6.3). The proportion of mothers discarding colostrum ranged from 34-44%, with no obvious pattern of seasonality. The findings do not suggest that season of birth represents a major confounding variable.

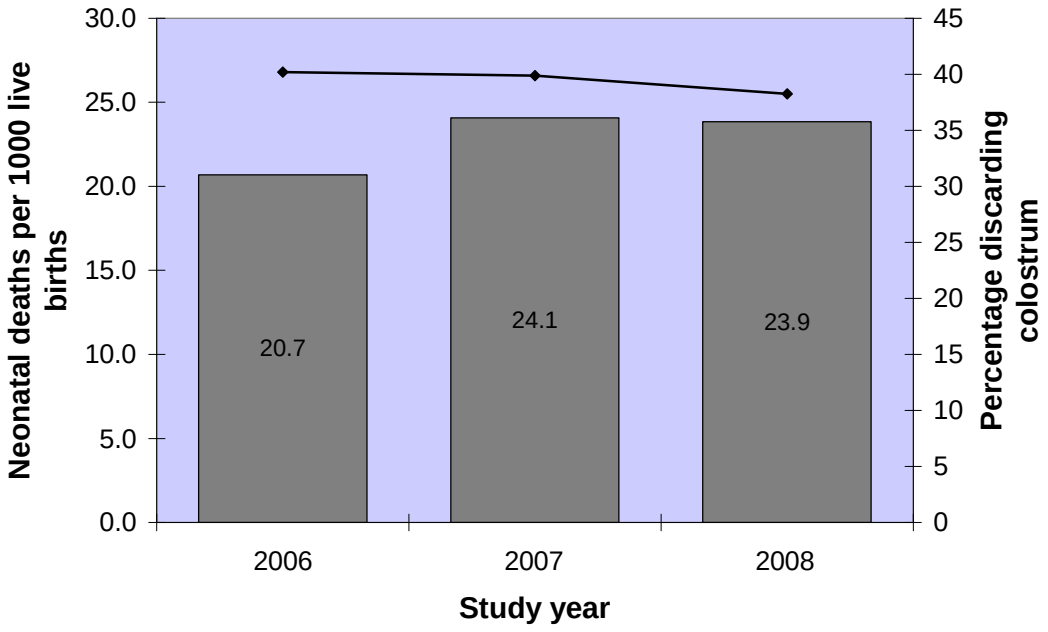
Figure 6.3: Neonatal mortality rate (bars) and colostrum discarding rate (line) by month, after application of exclusion criteria; data collected September 2006 to April 2008



6.1.6 Secular trend in neonatal mortality and colostrum discarding

Neonatal mortality rates displayed no clear secular trend from September 2006 to April 2008 (Figure 6.4), after application of exclusion criteria. Rates of reported discarding of colostrum showed modest sign of decline over the duration of the study period.

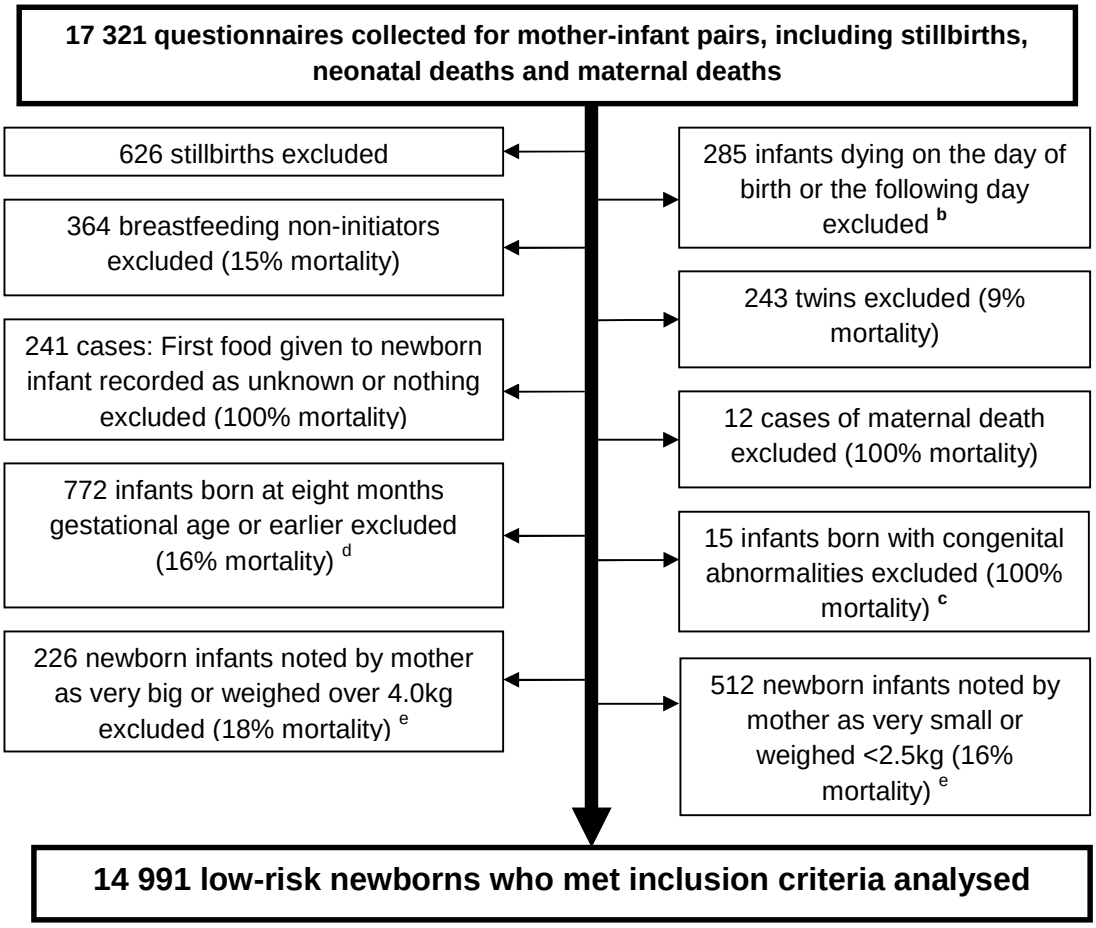
Figure 6.4: Neonatal mortality (bars) and colostrum discarding rates (line) by study year, after application of exclusion criteria; data collected September 2006 to April 2008



6.1.7 Profile of exclusion criteria

Figure 6.5 (adapted from Figure 3.5) demonstrates how many infants met each of the pre-analysis exclusion criteria employed to limit the influence of reverse causality. 2330 infants were excluded. Each infant could fall under several exclusion criteria simultaneously, and analyses presented in Sections 6.2 and 6.3 were repeated with the exclusion of all early neonatal deaths.

Figure 6.5: Profile of infant exclusion criteria for analysis, Dhanusha [a]



[a] One infant could meet several exclusion criteria.

[b] Primary analysis repeated with exclusion of all early neonatal deaths (days 1-7)

[c] Congenital abnormality information derived from verbal autopsy data only; no question on baby abnormality asked for surviving infants in Dhanusha. This exclusion criterion was selected for Dhanusha analyses in order to maintain consistency with the exclusion criteria employed for Makwanpur analyses

[d] Information on gestational age missing for 1703 cases

[e] Birth weight was measured for 2032 cases, 2021 of whom were infants surviving the neonatal period (i.e. infants who died were almost never weighed), while maternally perceived birth size was only recorded in the verbal autopsy questionnaire, i.e. for cases of neonatal mortality. There were too few cases (eight) where birth weight and perceived birth size were simultaneously recorded for it to be possible to validate the accuracy of perceived birth size against measured birth weight.

6.1.8 Household and participant characteristics by colostrum discarding status after application of exclusion criteria

Colostrum was discarded by 39% of participants after application of the exclusion criteria. Table 6.4 compares key household and participant characteristics amongst mothers who did and did not report that they discarded their first breastmilk. Several characteristics were not evenly distributed between the two groups, with discarders of colostrum tending to be of lower socioeconomic status and practising less favourable newborn care practices; mothers who discarded colostrum were less likely to be basically literate, tended to be poorer, were less likely to receive skilled birth attendance or antenatal care, and were more likely to give birth at home. Other dimensions of early infant feeding appear to bear a close relationship with colostrum discarding, with discarders more likely to give prelacteal feeds and less likely to initiate breastfeeding early (in contrast to Makwanpur where discarders were less likely to give prelacteal feeds and showed little relationship with initiation time).

Some other factors did not appear to influence the distribution of reported colostrum discarding: interventional allocation was approximately evenly distributed between discarders and non-discarders, as was ethnicity. Even though these variables, as well as season (Figure 6.3) and date of birth (Figure 6.4) appear unlikely to be confounding factors, they are included *a priori* in the models below to maintain comparability with the models presented for Makwanpur and other research on early infant feeding[138,160], and because of the potential for confounding despite the lack of visibly obvious relationships.

Figure 6.6 shows the distribution of wealth amongst mothers who reported discarding colostrum and those who did not. To a modest extent, the proportion of colostrum discarders in each wealth quintile progressively decreased as wealth increased. 44% of mothers reported that they discarded their first breastmilk in the least wealthy socioeconomic quintile, whereas only 34% of mothers reported that they discarded their first breastmilk in the wealthiest quintile.

Table 6.4: Comparison of study sample household and participant characteristics amongst colostrum discarders and non-discarders after application of exclusion criteria (n = 14 991)

Characteristic	Discarded colostrum (n = 5913) Frequency (%)	Did not discard colostrum (n = 9078) Frequency (%)
Maternal Status		
Basic or higher literacy [a]	972 (17.1)	2556 (29.2)
Mother's household in wealthiest 40% of the population [b]	2180 (36.9)	3898 (42.9)
Maternal Religion		
Buddhist	12 (0.2)	70 (0.8)
Hindu	5095 (86.2)	7926 (87.3)
Muslim (religion and ethnicity)	754 (12.8)	949 (10.5)
Maternal Ethnicity		
Dalit	**1445 (24.4)**	**2157 (23.8)**
Madeshi (plains) caste grouping, [c] *of which:*	**4882 (82.6)**	**7129 (78.5)**
Yadav	*1048 (17.7)*	*1631 (18.0)*
Mandal	*847 (14.3)*	*1211 (13.3)*
Sudi / Teli	*588 (9.9)*	*929 (10.2)*
Maternal Demographic Characteristics		
Mother's age at birth in years: Mean (SD)	Mean 23.7 (SD 5.1)	Mean 23.4 (SD 4.9)
Mother had previous pregnancy [d]	3717 (63.8)	5388 (61.3)
Previous pregnancy resulted in neonatal mortality	693 (11.7)	800 (8.8)
Breastfeeding Practices		
Given prelacteal feeds	2967 (50.2)	3255 (35.9)
Initiated early (≤24 hours)	1253 (21.2)	3482 (38.4)
Exclusively breastfed in the 7 days prior to interview	5144 (87.0)	7853 (86.5)
Infant Characteristics		
Sex of infant female	2773 (48.4)	3991 (47.0)
Health System and Birth Environment		
Birth assisted by skilled birth attendant (doctor, nurse, health assistant or auxiliary nurse midwife)	765 (12.9)	1947 (21.4)
Birth assisted by traditional birth attendant	1883 (31.8)	2421 (26.7)
Birthplace at home	5342 (90.3)	7320 (80.6)
Mother received any antenatal care	3373 (57.0)	6003 (66.1)
Residence in VDC Receiving Women's Group or FCHV Training Intervention (not intention-to-treat)		
Women's group	2970 (50.2)	4284 (47.2)
FCHV training	2146 (36.3)	3242 (35.7)
Total	**5913 (100)**	**9078 (100)**

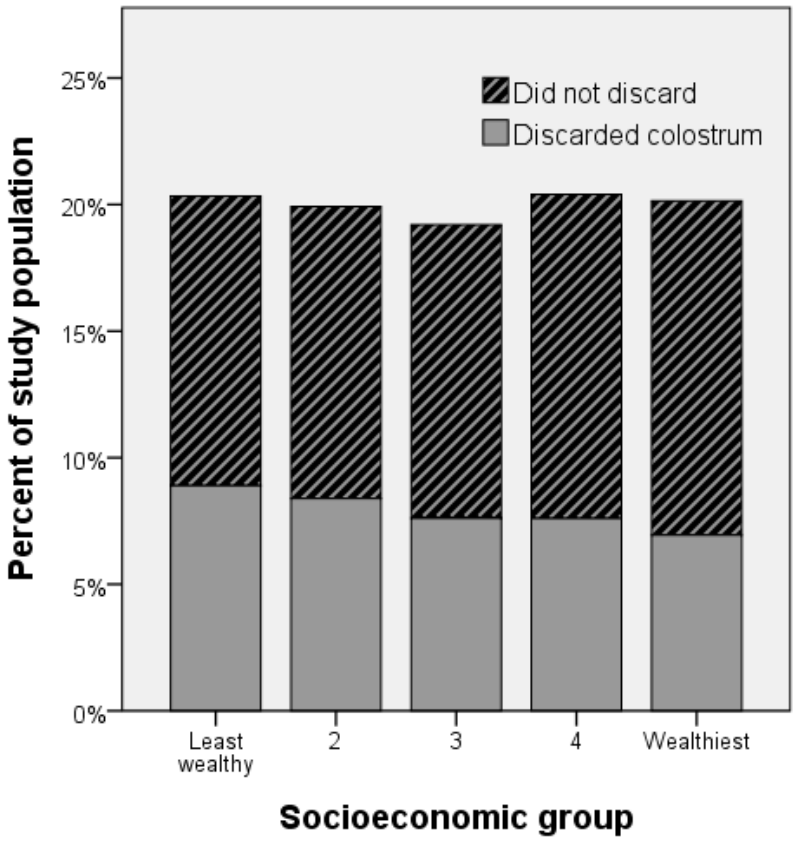
[a] Excludes consideration of 551 mothers for whom literacy data were absent

[b] See Figure 6.6 for further detail

[c] Includes Yadav, Mandal, Sudi / Teli, Muslims, some types of Dalit, plus further groups

[d] Excludes consideration of 368 mothers for whom previous pregnancy data were absent

Figure 6.6: Distribution of mothers discarding colostrum or not, by stacked wealth quintiles derived from principal components analysis scoring of asset ownership data, after exclusion criteria (n = 14 991) [a b]



[a] Each bar represents approximately one fifth of the total study population

[b] The y axis represents percentage of total study population per bar – the five bars contain a mean of 20% of the study population, and if all five bars were added on top of each other, they would add to 100%

6.1.9 Relationship between colostrum discarding and breastfeeding initiation time

In unadjusted analysis, colostrum discarding displayed a significant association with breastfeeding initiation time (Table 6.5). Mothers who discarded colostrum were more likely to have initiated breastfeeding after 24 hours. The majority of mothers who initiated feeding within 24 hours also did not discard colostrum (74%). One dimension does appear to predict the other in Dhanusha, and although they are not logically equivalent in all instances, they cannot be considered as entirely independent either. This is somewhat in contrast to what was observed in Makwanpur, where the relationship was less pronounced.

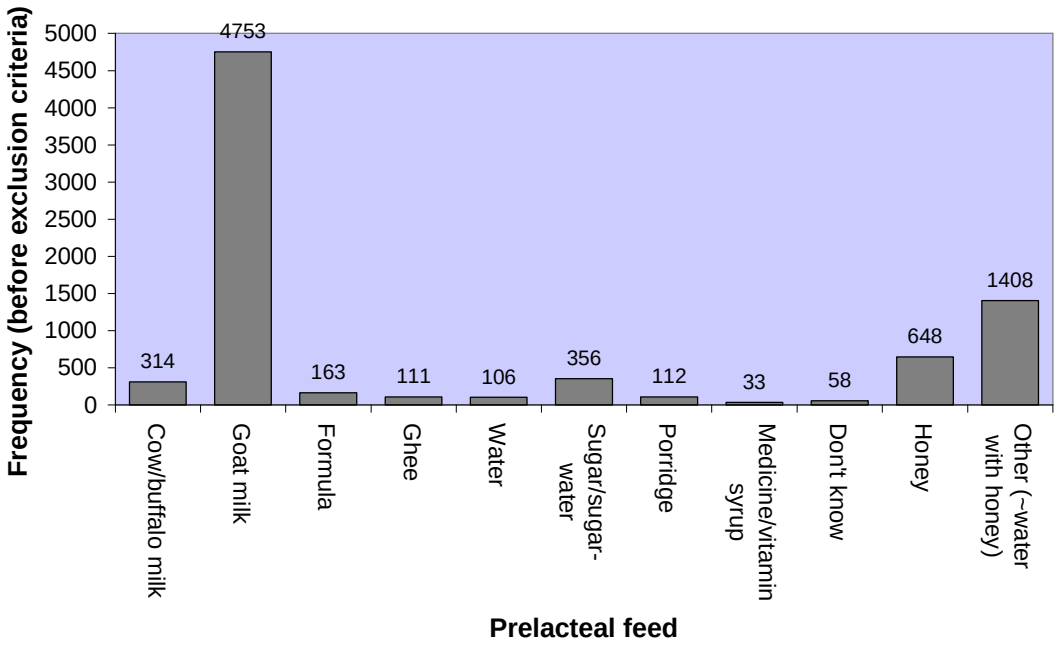
Table 6.5: Colostrum discarding by breastfeeding initiation category in singletons born at term who initiated breastfeeding and survived 48 hours (n = 14 991)

Breastfeeding initiation time	**Discarded colostrum (n = 5913)** Frequency (%)	**Did not discard colostrum (n = 9078)** Frequency (%)	**Total** Frequency (%)
Within 1h	333 (22.9)	1121 (77.1)	1454 (100)
From 1h to end day 1	920 (28.0)	2361 (72.0)	3281 (100)
Day 2	3134 (45.5)	3761 (54.5)	6895 (100)
Day 3	718 (44.5)	897 (55.5)	1615 (100)
After day 3	808 (46.3)	938 (53.7)	1746 (100)
Spearman's rank correlation, $p < 0.0001$			

6.1.10 Types of prelacteal feed

Figure 6.7 shows the distribution of prelacteal feeds given to infants, before application of the exclusion criteria. Goat's milk was the most common response, followed by honey (while the most frequently occurring 'other' responses typically contained water with honey). The distribution of reported prelacteal feeds remained the same after application of the analysis exclusion criteria.

Figure 6.7: Frequency of types of prelacteal feed, before exclusion criteria (n = 17 321)



6.1.11 Relationship between colostrum discarding and prelacteal feeding

In unadjusted analysis, mothers who discarded colostrum were more likely to have also given their newborn infants prelacteal feeds (Table 6.6), with the two variables demonstrating a significant association in χ-square analysis of a 2x2 table. This is in direct contrast to what was observed in Makwanpur.

Table 6.6: Colostrum discarding by prelacteal feeding status in singletons born at term who initiated breastfeeding and survived 48 hours (n = 14 991). Figures displayed as n (row %)

	Discarded colostrum (n = 5913)	**Did not discard colostrum (n = 9078)**	**Total**
No prelacteal feeding	2946 (33.6)	5823 (66.4)	8769 (100)
Prelacteal feeding	2967 (47.7)	3255 (52.3)	6222 (100)
Pearson χ-square with continuity correction, $p < 0.0001$			

6.2 PRIMARY ANALYSIS - DISCARDING OF FIRST MILK AND NEONATAL MORTALITY

6.2.1 Primary analysis: Infants surviving 48 hours

Analysis was conducted of the association between maternally reported discarding of first breastmilk and neonatal mortality, after application of the exclusion criteria as described in Figure 6.5. Colostrum was discarded for 39% of singletons born at term who initiated breastfeeding and survived 48 hours, and there were a total of 346 deaths, giving a rate of 23.1 deaths per 1000 live births (Table 6.7). The neonatal mortality rate was 26.6 deaths per 1000 live births amongst infants of mothers who reported that they discarded colostrum, compared to 20.8 amongst non-discarders, giving a crude odds ratio of 1.28 (1.04-1.59, p = 0.023).

Presentation of results. Table 6.7 displays adjusted odds ratios generated from a progression of random effects logistic regression models as described in Section 3.8, comparing risks of neonatal mortality according to colostrum discarding status in singletons born at term who initiated breastfeeding and survived at least 48 hours. Each model is nested within the next to test for improvement of fit with likelihood ratio tests; the crude unadjusted model above is nested within model (i) (aOR1in Table 6.7), model (i) is nested within model (ii) (aOR2), and so on.

Principal findings. Table 6.7 indicates that the adjusted odds ratio for neonatal mortality risk amongst colostrum discarders compared to non-discarders was 1.29 (95% CI: 1.02 - 1.63) in the context of a wide range of potential confounding variables (aOR1), and was 1.28 (95% CI: 1.00 - 1.62) after the addition of prelacteal feeding and breastfeeding initiation time as terms in the model (aOR4). Crude odds ratios and three of the four adjusted odds ratios suggest a significant relationship; after adjustment for a wide range of potential confounding variables including other dimensions of early infant feeding the findings demonstrate a marginally significant association between colostrum discarding and neonatal mortality.

Likelihood ratio tests comparing the fit of each model suggest that model 1 (aOR1, Table 6.7) had significantly better fit than a crude unadjusted model with no covariates other than colostrum discarding and neonatal death. The addition of prelacteal feeding as a term (aOR2) did not significantly improve fit over model 1 ($p=0.295$), while the addition of breastfeeding initiation time (aOR3 and aOR4) led to a significant improvement in fit over model 1 ($p<0.0001$ for both models 3 and 4 compared to model 1).

Table 6.7: Odds of neonatal mortality according to colostrum discarding status in singletons born at term who initiated breastfeeding and survived 48 hours

	No. (%) of Neonates	Deaths (%)	Rate, per 1000 live births	aOR1 (95% CI; p)[a]	aOR2 (95% CI; p)[b]	aOR3 (95% CI; p)[c]	aOR4 (95% CI; p)[d]
Colostrum not discarded	9078 (60.6)	189 (54.6)	20.8	1	1	1	1
Colostrum discarded	5913 (39.4)	157 (45.4)	26.6	1.29 (1.02 – 1.63; p=0.030)	1.33 (1.05 – 1.67; p=0.018)	1.25 (0.99 – 1.59; p=0.060)	1.28 (1.00 – 1.62; p=0.043)
LRT, p [e]	-	-	-	p<0.0001	p=0.295	- [f]	p=0.004 [g]
PAR, % (95% CI) [h]	-	-	-	-	-	-	9.9 (0.0 - 17.4)
Total	14 991 (100)	346 (100)	23.1				

[a] Odds ratio 1 adjusted for exposure to the women's group intervention, exposure to the FCHV training intervention, household religion, Pahadi/Madeshi caste grouping, season of birth, maternal literacy, maternal age, primiparity, previous neonatal death, number of antenatal care visits, home birth, skilled birth attendance, infant sex, date of birth, exclusive breastfeeding, and socioeconomic status

[b] Odds ratio 2 adjusted for all factors listed for aOR1, plus prelacteal feeding

[c] Odds ratio 3 adjusted for all factors listed for aOR1, plus breastfeeding initiation time

[d] Odds ratio 4 adjusted for all factors listed for aOR1, plus prelacteal feeding and breastfeeding initiation time

[e] Likelihood ratio test checks for improvement in model fit, nesting each model in the next; the crude model is nested in model 1 (aOR1), model 1 in model 2 (aOR2), model 2 could not be nested in model 3 because of equality in degrees of freedom, and model 3 is nested in model 4 (aOR4)

[f] Likelihood ratio test, nesting model 1 in model 3: p<0.0001

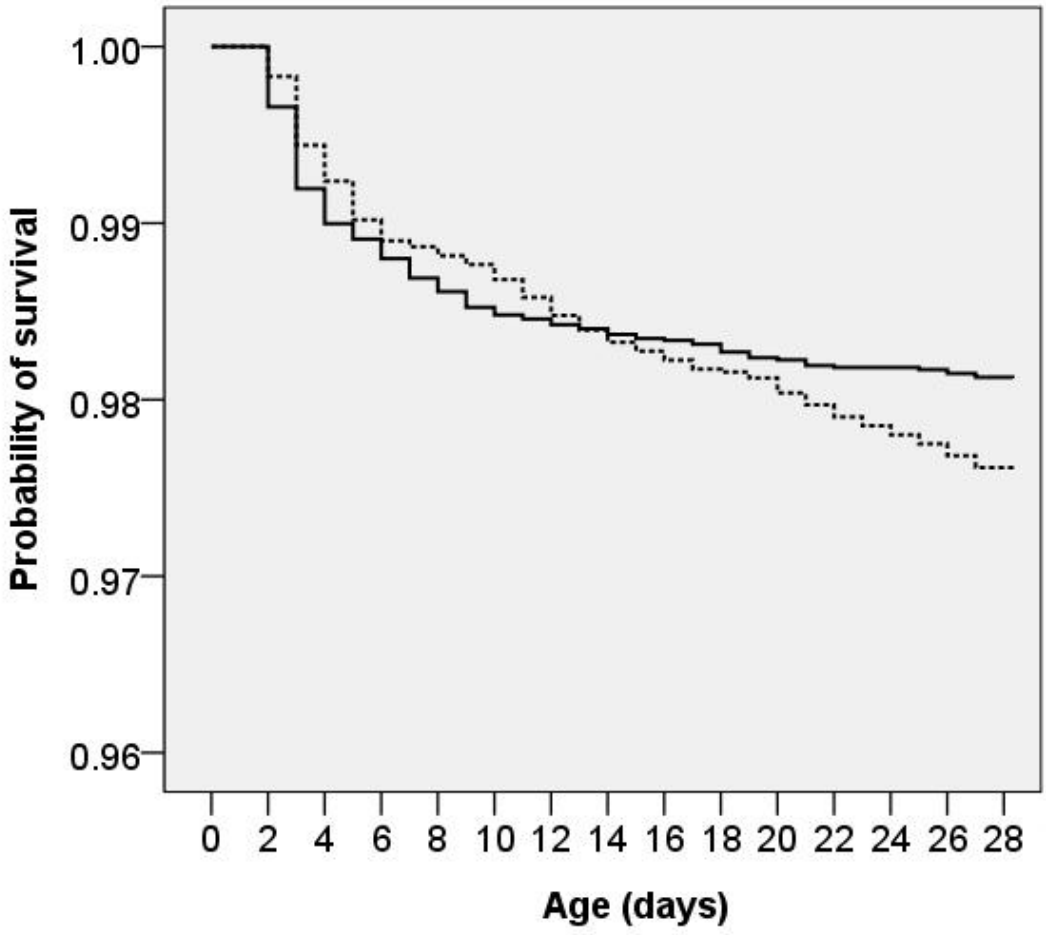
[g] Likelihood ratio test, nesting model 1 in model 4: p<0.0001

[h] Population attributable risk calculated as:

100 x [(aOR – 1)/aOR] x [number of deaths in exposed group/overall number of deaths]

Survival curves. Kaplan-Meier survival curves suggest that in the first two weeks of the neonatal period, infants of mothers who discarded colostrum experienced a similar risk of mortality compared with infants of mothers who did not discard (Figure 6.8). However, after approximately two weeks, discarders appear to experience a higher continuing risk of mortality, while the curve for non-discarders levels off; although lacking firm evidence, it appears that a higher probability of survival was experienced by non-discarders in the second half of the neonatal period. Both curves display a high overall probability of neonatal survival (above 97.5%) because the applied exclusion criteria eliminated deaths in the first two days postpartum and the majority of other high risk births.

Figure 6.8: Risk of neonatal mortality by colostrum discarding in singletons born at term who initiated breastfeeding and survived 48 hours (Kaplan-Meier survival curves)



Population attributable risk. Despite the 95% CI for PAR overlapping with 0%, it may still be calculated for illustrative purposes. Treating aOR4 (Table 6.7) as equivalent to relative risk, the results suggest that 9.9% (95% CI: 0.0% - 17.4%) of neonatal deaths could be averted if all mothers did not discard colostrum, amongst the analysed low-risk group of singletons born at term who initiated breastfeeding and survived 48 hours. If the PAR calculation is extended to consider all 706 neonatal deaths over the study period, before application of the exclusion criteria, then the revised PAR is 4.9% (95% CI: 0.0% - 8.5%). This assumes that deaths that occur, for example, in the first two days postpartum are unaffected by colostrum discarding and have a RR of 1.

Modelling neonatal mortality without colostrum discarding as a term. A fifth model ('model 5') was constructed, identical to model 4 described above (Table 6.7, aOR4), except with the omission of colostrum discarding as a term, to test whether the presence of colostrum discarding as a variable improves model fit. Nesting model 5 in model 4, a likelihood ratio test indicates that a model containing colostrum discarding as a term conveys a marginally significant improvement in fit over one without (p=0.043).

Goodness-of-fit. A log-likelihood chi-square test was manually performed, since Intercooled Stata version 11 does not permit Hosmer and Lemeshow's or other goodness-of-fit tests following random effects logistic regression modelling. Likelihood ratio tests were also performed comparing full models (including all terms) with a baseline model containing the constant only, to test for significant improvement in fit. For the models included in Table 6.7 and all following models in the chapter that show significant findings, these diagnostic tests indicated adequate goodness-of-fit, and are not displayed. As a further check, the models of Table 6.7 were repeated with standard logistic regression, not taking into account clustering, and Hosmer and Lemeshow's goodness-of-fit test continued to indicate (marginally) that the models fitted the data adequately (p=0.071 for model 4, whereby a p-value of less than 0.05 would suggest a significant divergence between predicted and actual values).

Diagnostic tests for colinearity between covariates in the models were not explicitly performed, although standard errors and confidence interval ranges, in conjunction with preliminary exploration and theoretical understanding of the variables, did not suggest difficulties in this respect.

6.2.2 Primary analysis: Infants surviving the early neonatal period

Analysis was repeated of the association between maternally reported discarding of first breastmilk and neonatal mortality, with the additional criterion of exclusion of all deaths in the early neonatal period. In this smaller group of infants surviving at least seven days, colostrum was discarded for 39% of singletons born at term who initiated breastfeeding (Table 6.8), and a total of 14 813 infants were included in analysis after applying this further criterion. The late neonatal mortality rate was 15.6 deaths per 1000 live births amongst infants of mothers who reported that they discarded colostrum, compared to 8.6 amongst non-discarders, giving a crude odds ratio of 1.83 (1.35-2.48, $p<0.0001$). This is a notably stronger effect than the crude odds ratio of 1.28 associated with Table 6.7.

Table 6.8 displays adjusted odds ratios generated from a progression of random effects logistic regression models as for Table 6.7, the only difference being the additional inclusion criteria whereby infants survived at least seven days. The adjusted odds ratio for neonatal mortality amongst colostrum discarders compared to non-discarders was 1.94 (95% CI: 1.40 - 2.68) in the context of an initial range of potential confounding variables (aOR1), and remained significant, becoming 1.96 (95% CI: 1.41 - 2.72) after the addition of prelacteal feeding and breastfeeding initiation time as terms in the model (aOR4). Likelihood ratio tests suggested that model 1 had significantly better fit than an unadjusted model with no covariates other than colostrum discarding and neonatal death. The addition of prelacteal

feeding as a term (aOR2) conveyed a marginally significant improvement in fit over model 1 ($p=0.045$). The addition of breastfeeding initiation time (aOR3 and aOR4) conveyed a significant improvement in fit over model 1 ($p<0.0001$ in both instances).

Treating aOR4 (Table 6.8) as equivalent to relative risk, the results suggest that 26.5% (95% CI: 15.8% - 34.3%) of late neonatal deaths could be averted if all mothers did not discard colostrum, amongst the analysed low-risk group of singletons born at term who initiated breastfeeding and survived 7 days.

Comparison of Tables 6.7 and 6.8, in the light of the Kaplan-Meier survival curves of Figure 6.8, suggests that a significant effect of colostrum discarding is observable in the late neonatal period but less so in the early neonatal period; the impact of colostrum discarding may be dynamic over time from birth in this context.

Further analyses throughout this chapter were conducted both for infants surviving two days, and for infants meeting the stricter inclusion criteria of surviving one week, since the results of Section 6.2 suggest that the effect of different early infant feeding practices may not be the same for the early and late neonatal periods.

Table 6.8: Odds of neonatal mortality according to colostrum discarding status in singletons born at term who initiated breastfeeding and survived 7 days

	No. (%) of Neonates	Deaths (%)	Rate, per 1000 live births	aOR1 (95% CI; p)[a]	aOR2 (95% CI; p)[b]	aOR3 (95% CI; p)[c]	aOR4 (95% CI; p)[d]
Colostrum not discarded	8966 (60.5)	77 (45.8)	8.6	1	1	1	1
Colostrum discarded	5847 (39.5)	91 (54.2)	15.6	1.94 (1.40 – 2.68; p<0.0001)	2.03 (1.47 – 2.81; p<0.0001)	1.90 (1.37 – 2.65; p<0.0001)	1.96 (1.41 – 2.72; p<0.0001)
LRT, p [e]	-	-	-	p<0.0001	p=0.045	- [f]	p=0.001 [g]
PAR, % (95% CI) [h]	-	-	-	-	-	-	26.5 (15.8 - 34.3)
Total	14 813 (100)	168 (100)	11.3				

[a] Odds ratio 1 adjusted for exposure to the women's group intervention, exposure to the FCHV training intervention, household religion, Pahadi/Madeshi caste grouping, season of birth, maternal literacy, maternal age, primiparity, previous neonatal death, number of antenatal care visits, home birth, skilled birth attendance, infant sex, date of birth, exclusive breastfeeding, and socioeconomic status

[b] Odds ratio 2 adjusted for all factors listed above for aOR1, plus prelacteal feeding

[c] Odds ratio 3 adjusted for all factors listed for aOR1, plus breastfeeding initiation time

[d] Odds ratio 4 adjusted for all factors listed for aOR1, plus prelacteal feeding and breastfeeding initiation time

[e] Likelihood ratio test checks for improvement in model fit, nesting each model in the next; the crude model is nested in model 1 (aOR1), model 1 in model 2 (aOR2), model 2 could not be nested in model 3 because of equality in degrees of freedom, and model 3 is nested in model 4 (aOR4)

[f] Likelihood ratio test, nesting model 1 in model 3: p<0.0001

[g] Likelihood ratio test, nesting model 1 in model 4: p=0.0001

[h] Population attributable risk calculated as:

100 x [(aOR – 1)/aOR] x [number of deaths in exposed group/overall number of deaths]

6.3 SECONDARY ANALYSES

6.3.1 Discarding of first milk and suspected acute respiratory infection

Analysis was conducted of the association between maternally reported discarding of first breastmilk and suspected ARI, after application of the exclusion criteria described in Figure 6.5. There were a total of 2068 cases of suspected neonatal ARI, giving a rate of 137.9 per 1000 live births (Table 6.9). Such a high rate – 14% of births, compared to 9% in Makwanpur – may suggest a lack of specificity for this composite indicator in the context of Dhanusha, however for consistency the same criteria were employed in the construction of this variable as were used for Makwanpur. The rate of suspected neonatal ARI was 149.2 cases per 1000 singleton live births of ever-breastfed infants born at term and surviving to day 2 amongst infants of mothers who reported that they discarded colostrum, compared to 130.6 per 1000 amongst non-discarders, giving a crude odds ratio of 1.17 (1.06-1.28, p=0.001).

Table 6.9 displays adjusted odds ratios generated from a progression of random effects logistic regression models, comparing risks of suspected neonatal ARI according to colostrum discarding status in singletons born at term who initiated breastfeeding and survived at least 48 hours. The adjusted odds ratio for suspected neonatal ARI amongst colostrum discarders compared to non-discarders became non-significant at 1.05 (95% CI: 0.95 - 1.17) after adjustment for a wide range of potential confounding variables (aOR1), and 1.04 (95% CI: 0.94 - 1.16) after the addition of prelacteal feeding and breastfeeding initiation time as terms in the model (aOR4), despite the fact that unadjusted odds ratios suggest a significant relationship.

Table 6.9: Odds of suspected neonatal ARI according to colostrum discarding status in singletons born at term who initiated breastfeeding and survived 48 hours

	No. (%) of Neonates	Cases of Susp. ARI (%)	Rate, per 1000 live births	aOR1 (95% CI; p)[a]	aOR2 (95% CI; p)[b]	aOR3 (95% CI; p)[c]	aOR4 (95% CI; p)[d]
Colostrum not discarded	9078 (60.6)	1186 (57.4)	130.6	1	1	1	1
Colostrum discarded	5913 (39.4)	882 (42.6)	149.2	1.05 (0.95 – 1.17; p=0.342)	1.05 (0.94 – 1.17; p=0.369)	1.04 (0.94 – 1.16; p=0.462)	1.04 (0.94 – 1.16; p=0.465)
LRT, p [e]	-	-	-	p<0.0001	p=0.582	- [f]	p=0.958 [g]
Total	14 991 (100)	2068 (100)	137.9				

[a] Odds ratio 1 adjusted for exposure to the women's group intervention, exposure to the FCHV training intervention, household religion, Pahadi/Madeshi caste grouping, season of birth, maternal literacy, maternal age, primiparity, previous neonatal death, number of antenatal care visits, home birth, skilled birth attendance, infant sex, date of birth, exclusive breastfeeding, and socioeconomic status

[b] Odds ratio 2 adjusted for all factors listed for aOR1, plus prelacteal feeding

[c] Odds ratio 3 adjusted for all factors listed for aOR1, plus breastfeeding initiation time

[d] Odds ratio 4 adjusted for all factors listed for aOR1, plus prelacteal feeding and breastfeeding initiation time

[e] Likelihood ratio test checks for improvement in model fit, nesting each model in the next; the crude model is nested in model 1 (aOR1), model 1 in model 2 (aOR2), model 2 could not be nested in model 3 because of equality in degrees of freedom, and model 3 is nested in model 4 (aOR4)

[f] Likelihood ratio test, nesting model 1 in model 3: p=0.357

[g] Likelihood ratio test, nesting model 1 in model 4: p=0.496

[h] Population attributable risk calculated as:

100 x [(aOR – 1)/aOR] x [number of cases in exposed group/overall number of cases]

Likelihood ratio tests comparing the fit of each model suggest that model 1 has significantly better fit than a crude unadjusted model with no covariates other than colostrum discarding and neonatal death. Additional terms (prelacteal feeding and breastfeeding initiation time) convey no significant improvement in fit. PAR is not expressed here because of non-significant odds ratios.

The analyses of Table 6.9 were repeated with infants who met the stricter inclusion criteria of surviving one week. For all models, the relationship between colostrum discarding and suspected neonatal ARI remained non-significant.

6.3.2 Discarding of first milk and infection-specific neonatal mortality

After application of exclusion criteria, there were 164 deaths attributable to severe infection (Table 6.10). The infection-specific neonatal mortality rate was 8.9 deaths per 1000 singleton live births amongst colostrum non-discarders, and 14.0 deaths per 1000 live births amongst infants of mothers who reported discarding colostrum, giving an unadjusted odds ratio of 1.58 (1.16-2.15, p=0.004).

The adjusted odds ratio for infection-specific mortality amongst infants of mothers who discarded colostrum compared to those who did not was 1.64 (95% CI: 1.19 – 2.27) in the context of a wide range of potential confounding variables (aOR1), and increased to 1.68 (95% CI: 1.21 – 2.34) after the addition of breastfeeding initiation time and prelacteal feeding as terms in the model (aOR4). The findings suggest an association between colostrum discarding and infection-specific neonatal mortality, after controlling for other dimensions of early infant feeding.

Likelihood ratio tests comparing the fit of each model suggest that model 1 (aOR1) conveys significantly better fit than a model with no covariates other than colostrum

discarding and neonatal death. The addition of prelacteal feeding as a term (aOR2) did not lead to a significant improvement in model fit over model 1 (p=0.182), while the addition of breastfeeding initiation time (aOR3 and aOR4) conveys a significant improvement in fit over model 1 (p<0.0001 in both cases).

Treating aOR4 (Table 6.10) as equivalent to relative risk, the results suggest that 20.5% (95% CI: 8.8% - 29.0%) of infection-specific neonatal deaths could be averted if all mothers did not discard colostrum, amongst the analysed low-risk group of singletons born at term who initiated breastfeeding and survived 48 hours.

The analyses of Table 6.10 were repeated for infants who met the stricter inclusion criteria of surviving one week. For all four models, the odds ratios of infection-specific neonatal mortality increased considerably (Table 6.10b). After adjustment for the same range of potentially confounding variables as for Table 6.10, including prelacteal feeding and breastfeeding initiation time (aOR4), the odds ratio of infection-specific neonatal mortality amongst colostrum discarders compared to non-discarders was 2.80 (95% CI: 1.76 – 4.47). This contrast in findings between Tables 6.10 and 6.10b mimics that found earlier between Tables 6.7 and 6.8, whereby the influence of colostrum discarding appears to be greater in the late neonatal period than the early neonatal period.

Table 6.10: Odds of infection-specific neonatal mortality according to colostrum discarding status in singletons born at term who initiated breastfeeding and survived 48 hours

	No. (%) of Neonates	Infect. specif. deaths (%)	Rate, per 1000 live births	aOR1 (95% CI; p)[a]	aOR2 (95% CI; p)[b]	aOR3 (95% CI; p)[c]	aOR4 (95% CI; p)[d]
Colostrum not discarded	9078 (60.6)	81 (49.4)	8.9	1	1	1	1
Colostrum discarded	5913 (39.4)	83 (50.6)	14.0	1.64 (1.19 – 2.27; p=0.003)	1.69 (1.22 – 2.34; p=0.002)	1.65 (1.18 – 2.29; p=0.003)	1.68 (1.21 – 2.34; p=0.002)
LRT, p [e]	-	-	-	p<0.0001	p=0.182	- [f]	p=0.024 [g]
PAR, % (95% CI) [h]	-	-	-	-	-	-	20.5 (8.8 - 29.0)
Total	14 991 (100)	164 (100)	10.9				

[a] Odds ratio 1 adjusted for exposure to the women's group intervention, exposure to the FCHV training intervention, household religion, Pahadi/Madeshi caste grouping, season of birth, maternal literacy, maternal age, primiparity, previous neonatal death, number of antenatal care visits, home birth, skilled birth attendance, infant sex, date of birth, exclusive breastfeeding, and socioeconomic status

[b] Odds ratio 2 adjusted for all factors listed for aOR1, plus prelacteal feeding

[c] Odds ratio 3 adjusted for all factors listed for aOR1, plus breastfeeding initiation time

[d] Odds ratio 4 adjusted for all factors listed for aOR1, plus prelacteal feeding and breastfeeding initiation time

[e] Likelihood ratio test checks for improvement in model fit, nesting each model in the next; the crude model is nested in model 1 (aOR1), model 1 in model 2 (aOR2), model 2 could not be nested in model 3 because of equality in degrees of freedom, and model 3 is nested in model 4 (aOR4)

[f] Likelihood ratio test, nesting model 1 in model 3: p<0.0001

[g] Likelihood ratio test, nesting model 1 in model 4: p<0.0001

[h] Population attributable risk calculated as:

100 x [(aOR – 1)/aOR] x [number of deaths in exposed group/overall number of deaths]

Table 6.10b: Odds of infection-specific neonatal mortality according to colostrum discarding status in singletons born at term who initiated breastfeeding and survived 7 days

	No. (%) of Neonates	Infect. specif. deaths (%)	Rate, per 1000 live births	aOR1 (95% CI; p)[a]	aOR2 (95% CI; p)[b]	aOR3 (95% CI; p)[c]	aOR4 (95% CI; p)[d]
Colostrum not discarded	8966 (60.5)	35 (39.8)	3.9	1	1	1	1
Colostrum discarded	5847 (39.5)	53 (60.2)	9.1	2.62 (1.66 – 4.12; p<0.0001)	2.77 (1.76 – 4.36; p<0.0001)	2.71 (1.70 – 4.31; p<0.0001)	2.80 (1.76 – 4.47; p<0.0001)
LRT, p [e]	-	-	-	p<0.0001	p=0.051	- [f]	p=0.001 [g]
PAR, % (95% CI) [h]	-	-	-	-	-	-	38.7 (26.0 - 46.8)
Total	14 813 (100)	88 (100)	5.9				

[a] Odds ratio 1 adjusted for exposure to the women's group intervention, exposure to the FCHV training intervention, household religion, Pahadi/Madeshi caste grouping, season of birth, maternal literacy, maternal age, primiparity, previous neonatal death, number of antenatal care visits, home birth, skilled birth attendance, infant sex, date of birth, exclusive breastfeeding, and socioeconomic status

[b] Odds ratio 2 adjusted for all factors listed for aOR1, plus prelacteal feeding

[c] Odds ratio 3 adjusted for all factors listed for aOR1, plus breastfeeding initiation time

[d] Odds ratio 4 adjusted for all factors listed for aOR1, plus prelacteal feeding and breastfeeding initiation time

[e] Likelihood ratio test checks for improvement in model fit, nesting each model in the next; the crude model is nested in model 1 (aOR1), model 1 in model 2 (aOR2), model 2 could not be nested in model 3 because of equality in degrees of freedom, and model 3 is nested in model 4 (aOR4)

[f] Likelihood ratio test, nesting model 1 in model 3: p<0.0001

[g] Likelihood ratio test, nesting model 1 in model 4: p<0.0001

[h] Population attributable risk calculated as:

100 x [(aOR – 1)/aOR] x [number of deaths in exposed group/overall number of deaths]

6.3.3 Prelacteal feeding and all-cause neonatal mortality

Analysis of the association between maternally reported prelacteal feeding and all-cause neonatal mortality was conducted, after application of the exclusion criteria described in Figure 6.5. Prelacteal feeds were given to 42% of singletons born at term who initiated breastfeeding and survived 48 hours (Table 6.11). The neonatal mortality rate was 22.0 deaths per 1000 live births amongst infants of mothers who reported that they gave prelacteal feeds, compared to 23.8 amongst those who did not, giving an unadjusted odds ratio of 0.92 (0.74-1.15, p=0.466).

Table 6.11 displays adjusted odds ratios generated from a progression of random effects logistic regression models as described in Section 3.9, comparing risks of neonatal mortality by prelacteal feeding in singletons born at term who initiated breastfeeding and survived at least 48 hours. The adjusted odds ratio for neonatal mortality amongst infants given prelacteal feeds compared to those not given prelacteal feeds was 0.96 (95% CI: 0.76 – 1.20) in the context of a wide range of potential confounding variables (aOR1), and converged to 0.92 (95% CI: 0.72 – 1.16) after the addition of colostrum discarding and breastfeeding initiation time as terms in the model (aOR4). The findings do not suggest an association between prelacteal feeding and neonatal mortality. PAR is not expressed because of non-significant odds ratios.

Likelihood ratio tests comparing the fit of each model suggest that model 1 conveys significantly better fit than a model with no covariates other than prelacteal feeding and neonatal death. The addition of colostrum discarding as a term (aOR2) leads to a significant improvement in fit over model 1 (p=0.018), while the addition of breastfeeding initiation time (aOR3 and aOR4) conveys a highly significant improvement in fit over model 1 (p<0.0001 for both models).

The analyses of Table 6.11 were repeated with infants who met the stricter inclusion criteria of surviving one week. For all models, the relationship between prelacteal feeding and neonatal mortality remained non-significant.

Table 6.11: Odds of neonatal mortality according to prelacteal feeding status in singletons born at term who initiated breastfeeding and survived 48 hours

	No. (%) of Neonates	Deaths (%)	Rate, per 1000 live births	aOR1 (95% CI; p)[a]	aOR2 (95% CI; p)[b]	aOR3 (95% CI; p)[c]	aOR4 (95% CI; p)[d]
No prelacteal feeding	8769 (58.5)	209 (60.4)	23.8	1	1	1	1
Prelacteal feeding	6222 (41.5)	137 (39.6)	22.0	0.96 (0.76 – 1.20; p=0.697)	0.94 (0.74 – 1.18; p=0.568)	0.93 (0.73 – 1.18; p=0.548)	0.92 (0.72 – 1.16; p=0.476)
LRT, p [e]	-	-	-	p<0.0001	p=0.018	- [f]	p=0.043 [g]
Total	14 991 (100)	346 (100)	23.1				

[a] Odds ratio 1 adjusted for exposure to the women's group intervention, exposure to the FCHV training intervention, household religion, Pahadi/Madeshi caste grouping, season of birth, maternal literacy, maternal age, primiparity, previous neonatal death, number of antenatal care visits, home birth, skilled birth attendance, infant sex, date of birth, exclusive breastfeeding, and socioeconomic status

[b] Odds ratio 2 adjusted for all factors listed for aOR1, plus colostrum discarding

[c] Odds ratio 3 adjusted for all factors listed for aOR1, plus breastfeeding initiation time

[d] Odds ratio 4 adjusted for all factors listed for aOR1, plus colostrum discarding and breastfeeding initiation time

[e] Likelihood ratio test checks for improvement in model fit, nesting each model in the next; the crude model is nested in model 1 (aOR1), model 1 in model 2 (aOR2), model 2 could not be nested in model 3 because of equality in degrees of freedom, and model 3 is nested in model 4 (aOR4)

[f] Likelihood ratio test, nesting model 1 in model 3: p<0.0001

[g] Likelihood ratio test, nesting model 1 in model 4: p<0.0001

6.3.4 Breastfeeding initiation time and all-cause neonatal mortality

Comparison of disaggregated breastfeeding initiation time categories. [a] Breastfeeding initiation time was categorised by initiation within 1 hour, within 24 hours but after the first hour, on day 2, day 3, or after day 3. Table 6.12 displays the proportions of infants initiating within each category, as well as neonatal mortality rates for each group. Of the sample of 14 991 infants, 9.7% initiated within one hour, 21.9% after one hour but within one day, 46.0% initiated on the second day, 11.6% initiated on the third day, and 10.8% initiated after day three. Treating 'within one hour' as the reference category, the unadjusted odds ratios for mortality were 1.03 (95% CI: 0.66 – 1.61) for the category of initiation within 24 hours but after the first hour, 0.77 (95% CI: 0.51 – 1.18) for day 2, 1.56 (95% CI: 0.98 – 2.49) for day 3, and 3.29 (95% CI: 2.15 – 5.04) after day 3. The neonatal mortality rate amongst infants of mothers who reported initiating breastfeeding after day 3 was 60.7 deaths per 1000 live births, compared to 19.3 deaths per 1000 live births for those initiating within the first hour, suggesting a large effect of delaying initiation until after day 3.

Table 6.12 displays adjusted odds ratios generated from a progression of random effects logistic regression models as described in Section 3.9, comparing risks of neonatal mortality by breastfeeding initiation category in singletons born at term who initiated breastfeeding and survived at least 48 hours. In all four adjusted models, risk of neonatal death was over two and a half times that of the reference category amongst infants initiating after day 3. The adjusted odds ratio for neonatal mortality amongst infants initiating after day 3 compared to those initiating within 1 hour was 2.66 (95% CI: 1.67 – 4.23) in the context of a wide range of potential confounding variables (aOR1), and increased to 2.97 (95% CI: 1.84 – 4.78) after the addition of colostrum discarding and breastfeeding initiation time as terms in the model (aOR4). Mantel-Haenszel tests for trend were significant in all instances.

[a] For Dhanusha the disaggregated breastfeeding initiation time categories are presented before the aggregated (≤24h vs. >24h) categories, because in this instance aggregation hides necessary detail; it is more informative to present the disaggregated categories first.

Likelihood ratio tests comparing the fit of each model suggest that model 1 conveys significantly better fit than a model with no covariates other than breastfeeding initiation time and neonatal death. The addition of colostrum discarding as a term (aOR2) leads to a marginally insignificant improvement in model fit over model 1 (p=0.061), while the addition of prelacteal feeding alone (model 3) does not lead to a significant improvement in fit over model 1 (p=0.182).

Table 6.12: Odds of neonatal mortality by breastfeeding initiation time category in singletons born at term who initiated breastfeeding and survived 48 hours

Initiation of breast-feeding	No. (%) of Neonates	Deaths (%)	Rate, per 1000 live births	aOR1 (95% CI; p)[a]	aOR2 (95% CI; p)[b]	aOR3 (95% CI; p)[c]	aOR4 (95% CI; p)[d]
Within 1h	1454 (9.7)	28 (8.1)	19.3	1	1	1	1
From 1h to end day 1	3281 (21.9)	65 (18.8)	19.8	1.21 (0.75 – 1.96; p=0.430)	1.20 (0.74 – 1.94; p=0.450)	1.29 (0.80 – 2.08; p=0.303)	1.28 (0.79 – 2.07; p=0.315)
Day 2	6895 (46.0)	103 (29.8)	14.9	0.68 (0.43 – 1.07; p=0.093)	0.66 (0.42 – 1.04; p=0.073)	0.77 (0.49 – 1.22; p=0.266)	0.75 (0.47 – 1.19; p=0.225)
Day 3	1746 (11.6)	52 (15.0)	29.8	1.47 (0.89 – 2.43; p=0.128)	1.42 (0.86 – 2.35; p=0.170)	1.66 (1.00 – 2.75; p=0.050)	1.60 (0.96 – 2.66; p=0.069)
After day 3	1615 (10.8)	98 (28.3)	60.7	2.66 (1.67 – 4.23; p<0.0001)	2.56 (1.61 – 4.09; p<0.0001)	3.07 (1.91 – 4.94; p<0.0001)	2.97 (1.84 – 4.78; p<0.0001)
LRT, p [e]	-	-	-	p<0.0001	p=0.061	- [f]	p=0.043 [g]
Mantel-Haenszel test for trend	-	-	-	p<0.0001	p<0.0001	p<0.0001	p<0.0001
Total	14 991 (100)	346 (100)	23.1				

[a] Odds ratio 1 adjusted for same variables as aOR1 in Table 6.13

[b] Odds ratio 2 adjusted for all factors listed for aOR1, plus colostrum discarding

[c] Odds ratio 3 adjusted for all factors listed for aOR1, plus prelacteal feeding

[d] Odds ratio 4 adjusted for all factors listed for aOR1, plus colostrum discarding and prelacteal feeding

[e] Likelihood ratio test checks for improvement in model fit, nesting each model in the next; the crude model is nested in model 1 (aOR1), model 1 in model 2 (aOR2), model 2 could not be nested in model 3 because of equality in degrees of freedom, and model 3 is nested in model 4 (aOR4)

[f] Likelihood ratio test, nesting model 1 in model 3: p=0.182

[g] Likelihood ratio test, nesting model 1 in model 4: p=0.003

Comparison of early (≤24 hours) and late (>24 hours) breastfeeding initiators. Breastfeeding was initiated early for 31.6% of singletons born at term who initiated breastfeeding and survived 48 hours (Table 6.13). The neonatal mortality rate was 19.6 deaths per 1000 live births amongst infants of mothers who reported that they initiated within 24 hours, compared to 24.7 amongst those who initiated after 24 hours, giving an odds ratio of 1.26 (0.99-1.61, p=0.057).

Table 6.13 displays adjusted odds ratios generated from a progression of random effects logistic regression models as described in Section 3.9, comparing risks of neonatal mortality by early or late breastfeeding initiation time in singletons born at term who initiated breastfeeding and survived at least 48 hours. The adjusted odds ratio for neonatal mortality amongst late compared to early initiators was 1.00 (95% CI: 0.77 – 1.29) in the context of a wide range of potential confounding variables (aOR1), and remained insignificant at 1.05 (95% CI: 0.80 – 1.37) after the addition of colostrum discarding and prelacteal feeding as terms in the model (aOR4). PAR is not expressed because of non-significant odds ratios.

Although the findings are non-significant after aggregation of breastfeeding initiation time categories, this is largely because the significant effect of delaying breastfeeding initiation beyond three days (observed in Table 6.12) is masked when it is aggregated with other initiation time categories that show no significant relationship. The null hypothesis, that breastfeeding initiation after 24 hours is not associated with an increased risk of neonatal mortality, cannot be rejected in this specific instance based on the analysis shown in Table 6.13, but when viewed in conjunction with Table 6.12, it becomes apparent that initiation time does have a large and significant effect for those infants initiating after the third day. In Makwanpur, aggregation to two initiation time categories was illustrative because so few infants initiated after 24 hours, but in Dhanusha this binary classification hides necessary detail.

Likelihood ratio tests comparing the fit of each model suggest that model 1 conveys significantly better fit than a model with no covariates other than breastfeeding initiation time and neonatal death. The addition of colostrum discarding as a term (aOR2) conveys a significant improvement in model fit over model 1 (p=0.030),

while the addition of prelacteal feeding (aOR3) does not lead to an improvement in fit over model 1.

For both Tables 6.12 and 6.13, there were no notable changes in odds ratios for any of the models when analyses were repeated under the stricter inclusion criteria of infants only surviving one week.

Table 6.13: Odds of neonatal mortality by early (≤ 24 hours) and late (> 24 hours) breastfeeding initiation time in singletons born at term who initiated breastfeeding and survived 48 hours

Initiation of breast-feeding	No. (%) of Neonates	Deaths (%)	Rate, per 1000 live births	aOR1 (95% CI; p)[a]	aOR2 (95% CI; p)[b]	aOR3 (95% CI; p)[c]	aOR4 (95% CI; p)[d]
Early initiation (≤ 24 hours)	4735 (31.6)	93 (26.9)	19.6	1	1	1	1
Late initiation (> 24 hours)	10 256 (68.4)	253 (73.1)	24.7	1.00 (0.77 – 1.29; p=0.975)	0.97 (0.74 – 1.26; p=0.805)	1.07 (0.82 – 1.41; p=0.601)	1.05 (0.80 – 1.37; p=0.742)
LRT, p [e]	-	-	-	p<0.0001	p=0.030	- [f]	p=0.020 [g]
Total	14 991 (100)	346 (100)	23.1				

[a] Odds ratio 1 adjusted for exposure to the women's group intervention, exposure to the FCHV training intervention, household religion, Pahadi/Madeshi caste grouping, season of birth, maternal literacy, maternal age, primiparity, previous neonatal death, number of antenatal care visits, home birth, skilled birth attendance, infant sex, date of birth, exclusive breastfeeding, and socioeconomic status

[b] Odds ratio 2 adjusted for all factors listed for aOR1, plus colostrum discarding

[c] Odds ratio 3 adjusted for all factors listed for aOR1, plus prelacteal feeding

[d] Odds ratio 4 adjusted for all factors listed for aOR1, plus colostrum discarding and prelacteal feeding

[e] Likelihood ratio test checks for improvement in model fit, nesting each model in the next; the crude model is nested in model 1 (aOR1), model 1 in model 2 (aOR2), model 2 could not be nested in model 3 because of equality in degrees of freedom, and model 3 is nested in model 4 (aOR4)

[f] Likelihood ratio test, nesting model 1 in model 3: p=0.118

[g] Likelihood ratio test, nesting model 1 in model 4: p=0.004

[h] Population attributable risk calculated as:

100 x [(aOR – 1)/aOR] x [number of deaths in exposed group/overall number of deaths]

6.3.5 Exclusive breastfeeding and all-cause neonatal mortality

Analysis of the association between maternally reported non-exclusive breastfeeding and all-cause neonatal mortality was conducted. However, analysis was restricted to infants for whom interview was conducted after four completed weeks postpartum but before five weeks. This decision was made because of concerns about the distribution of interview times (Figure 6.1), in conjunction with the fact that mothers were asked "what did you feed the baby in the last seven days?" as the data source from which to estimate exclusive breastfeeding at one month postpartum (in slight contrast to what was asked in Makwanpur). Since approximately half of interviews were taken at over six weeks postpartum, analysis of the full dataset from Dhanusha would describe the effect of exclusive breastfeeding over a loosely defined range of postpartum periods that spans several months, which is not instructive and which was not an objective of the thesis.

There were 3402 singletons born at term who initiated breastfeeding and survived 48 hours, whose mothers were interviewed between four and five weeks postpartum. Of these, 86% were exclusively breastfed, and 14% were non-exclusively breastfed (Table 6.14). The neonatal mortality rate was 16.0 deaths per 1000 live births amongst infants of mothers who reported that they exclusively breastfed, and 57.3 amongst those non-exclusively breastfeeding, giving an odds ratio of 3.73 (2.30-6.05, $p<0.0001$).

Only one adjusted model is presented in this instance. I was interested in the effect of exclusive breastfeeding in the context of colostrum discarding, prelacteal feeding and breastfeeding initiation time as covariates in a model, and it was not deemed necessary to disambiguate the effect of incrementally introducing these dimensions of early infant feeding as terms in separate models. The adjusted odds ratio for neonatal mortality amongst infants non-exclusively breastfed compared to those exclusively breastfed was 3.55 (2.09 – 6.03) in the context of a wide range of potential confounding variables (Table 6.14), including colostrum discarding, breastfeeding initiation time and prelacteal feeding.

The results suggest that 26.2% (95% CI: 19.0% - 30.4%) of neonatal deaths in Dhanusha could be averted if all mothers exclusively breastfed, amongst a low-risk group of singletons born at term who initiated breastfeeding and survived 48 hours.

Despite concerns over the distribution of interview times postpartum, and the wording of the question to establish exclusive breastfeeding, the decision was made to adjust for the exclusive breastfeeding variable in all other models presented in this chapter, that consider the entire Dhanusha dataset regardless of interview timing. This decision was made because exclusive breastfeeding does represent a genuine potential confounder, and adjusting for the available information was deemed to provide a more favourable alternative over not adjusting for exclusive breastfeeding at all.

Table 6.14: Odds of neonatal mortality by exclusive and non-exclusive breastfeeding in singletons born at term who initiated breastfeeding and survived 48 hours, restricted to infants interviewed between four and five completed weeks postpartum (n=3402)

	No. (%) of Neonates	Deaths (%)	Rate, per 1000 live births	Crude OR (95% CI; p)	aOR (95% CI; p)[a]
Exclusive feeding	2931 (86.2)	47 (63.5)	16.0	1	1
Non-exclusive feeding	471 (13.8)	27 (36.5)	57.3	3.73 (2.30 – 6.05; p<0.0001)	3.55 (2.09 – 6.03; p<0.0001)
PAR, % (95% CI) [b]	-	-	-	-	26.2 (19.0 – 30.4)
Total	3402 (100)	74 (100)	21.8		

[a] Odds ratio adjusted for exposure to the women's group intervention, exposure to the FCHV training intervention, household religion, Pahadi/Madeshi caste grouping, season of birth, maternal literacy, maternal age, primiparity, previous neonatal death, number of antenatal care visits, home birth, skilled birth attendance, infant sex, date of birth, exclusive breastfeeding, socioeconomic status, colostrum discarding, breastfeeding initiation time, and prelacteal feeding

[b] Population attributable risk calculated as:

100 x [(aOR – 1)/aOR] x [number of deaths in exposed group/overall number of deaths]

6.3.6 Risk factor analysis of covariates predicting colostrum discarding

In univariable analyses, incidence of colostrum discarding was at least suggestively correlated ($p<0.10$) with a wide range of possible factors related to mother's caste and status, birth attendance and perinatal events and environment, and other dimensions of early infant feeding, including multiple interaction effects between pairs of variables. Notable exceptions included sex of the newborn infant, infant date of birth (representing a lack of a secular trend in colostrum feeding prevalence over time), multiparity, and residence in a VDC receiving the FCHV training intervention, all of which were not associated with colostrum discarding risk.

Table 6.15 displays variables associated with colostrum discarding ($p<0.05$) and adjusted odds ratios for colostrum discarding when all terms are considered in an adjusted model. Of 24 variables suggestively correlated with colostrum discarding in univariable analyses, eight covariates remained significantly associated when included in multivariable random effects logistic regression analysis. No higher interaction terms remained significantly associated with colostrum discarding in the multivariable model; the model presented in Table 6.15 contains no significant interaction effects between pairs of covariates, and higher-order interaction effects (between three or more variables simultaneously) were not tested for.

The following terms were associated with colostrum discarding in univariable logistic regression analyses but not in the multivariable adjusted model: exposure to the women's group intervention, religion, maternal age, maternal age at marriage, primiparity, long labour, tetanus toxoid injection during pregnancy, BCG vaccination, birth location, birth during monsoon season, time to wrap the newborn infant, time to first bathe the newborn infant, skilled birth attendance, mother alone at birth, PCA wealth score, and room heating at delivery.

Table 6.15: Variables associated with colostrum discarding in mother-infant pairs who initiated breastfeeding, with adjusted odds ratios (n = 16 957)

Risk factor (measurement unit)	No. (%) of mothers or infants exposed	No. (%) discarding colostrum amongst exposed	aOR (per unit increase)	95% CI	p	Positive (+) / negative (-) association with colostrum discarding
Pahadi caste group (compared to Madeshi) [*]	327 (1.9)	52 (15.9)	0.37	0.27-0.52	<0.0001	_
Basic or higher literacy [a] [*]	3954 (24.7)	1052 (26.6)	0.68	0.62-0.74	<0.0001	_
Antenatal care (number of visits) [*]	Mean (SD): 2.0 (1.9)	N/A	0.97	0.95-0.98	<0.0001	_
Birth attended by traditional birth attendant [*]	4510 (26.6)	1971 (43.7)	1.15	1.06-1.26	0.001	+
Birth delivery room unheated	1570 (9.3)	624 (39.7)	1.36	1.07-1.73	0.013	+
Breastfeeding initiation after 24 hours	11 800 (69.6)	4934 (41.8)	1.62	1.49-1.77	<0.0001	+
Prelacteal feed given	6663 (39.3)	3136 (47.1)	1.41	1.31-1.52	<0.0001	+
Previous neonatal death [*]	1649 (9.7)	719 (43.6)	1.20	1.07-1.35	0.002	+
Total	16 957	6298 (37.1)				

[a] Excludes consideration of 938 mothers for whom literacy data were absent

[*] Indicates variables also found to be significantly associated with colostrum discarding in Makwanpur – caste and ethnicity are treated as approximately equivalent

Of the eight variables found to be significantly associated with colostrum discarding risk, five were positively associated and three were negatively associated (Table 6.15): TBA birth attendance, no heating of the delivery room, breastfeeding initiation after 24 hours, prelacteal feeding, and a previous neonatal death were all associated with increased risk of maternally reported discarding of first milk, whereas literacy, more antenatal care visits, and Pahadi caste grouping were all associated with decreased risk of maternally reported discarding of first milk.

The risk factor analysis for Dhanusha identified five covariates in common with that of Makwanpur, associated with maternal reporting of colostrum discarding: caste, literacy, number of antenatal care visits, birth attendance by a TBA, and experience of a previous neonatal death.

Several findings of interest from Dhanusha can be summarised as follows, which compliment what was observed for Makwanpur:

- *Discarding of first milk has a marginally significant relationship with neonatal mortality in singletons born at term who initiated breastfeeding and survived 48 hours (Table 6.7). However, after exclusion of infants dying within the early neonatal period, discarding of first milk nearly doubled the odds of late neonatal mortality (Table 6.8), and there was evidence to suggest that an observable impact of discarding colostrum may only begin in the late neonatal period (Figure 6.8).*
- *Similarly, discarding of first milk significantly increased the odds of infection-specific neonatal mortality in singletons born at term who initiated breastfeeding and survived 48 hours (Table 6.10), and more than doubled the odds of infection-specific neonatal mortality after exclusion of infants dying within the early neonatal period (Table 6.10b). However, colostrum discarding was not associated with increased odds of developing suspected ARI (Table 6.9), after adjustment for confounding variables.*
- *When disaggregated to narrow breastfeeding initiation time categories, initiation of breastfeeding after the third day was associated with an approximately threefold increase in the odds of neonatal mortality, after adjustment for colostrum discarding and prelacteal feeding (Table 6.12). When aggregated by early (≤24h) or late (>24h) timing, any significant effect of delayed breastfeeding initiation was no longer visible (Table 6.13).*
- *There was no significant association between prelacteal feeding and neonatal mortality risk (Table 6.11).*
- *Non-exclusive breastfeeding was associated with an over three-fold increase in the odds of mortality, amongst singletons born at term who initiated breastfeeding and survived 48 hours whose mothers were interviewed soon after the neonatal period (Table 6.14).*
- *In general across the analyses, addition of colostrum feeding as a term*

in models tended to improve model fit to a marginally significant extent, addition of breastfeeding initiation time tended to significantly improve fit, and addition of prelacteal feeding did not improve fit (with one marginal exception, Table 6.8).

- *Risk factors for colostrum discarding included caste grouping, literacy, number of antenatal care visits, TBA birth attendance, previous neonatal death, and the other two dimensions of early infant feeding in the first days postpartum: prelacteal feeding and breastfeeding initiation time (Table 6.15). Of these, five variables coincided with those identified in Makwanpur. Factors not found to be associated with discarding, before or after adjustment for other factors, included infant sex, infant date of birth, skilled birth attendance, maternal age at marriage, wealth score based on asset ownership data, and exposure to the women's group intervention.*
- *In univariable comparison, breastfeeding initiation time (Table 6.5) and prelacteal feeding (Table 6.6) were visibly associated with colostrum discarding, with late initiators significantly more likely to discard their first milk.*

I discuss interpretation of these results in Chapter 8, in the context of further avenues of evidence presented in the thesis.

CHAPTER 7: QUALITATIVE ANALYSIS AND RESULTS - MAKWANPUR

In Chapter 5 I showed that mothers in Makwanpur who responded positively to the closed binary question "before feeding the baby for the first time, did you squeeze and throw milk?" were at double the risk of having their infant die in the neonatal period. This is a large effect for a behaviour that is still little understood.

The primary objective of the qualitative component of the thesis was to describe the nature of, and reasons behind, practices and behaviours related to colostrum or first breastmilk in Makwanpur, with consideration of how colostrum discarding may be related to other dimensions of early infant feeding. A secondary objective was to determine which sorts of behaviours and responses were categorised as discarding or not of colostrum in the MIRA Makwanpur questionnaire.

To frame this chapter, I begin with a brief background of why the decision to include a question on discarding of first breastmilk in the original MIRA Makwanpur questionnaire was made by MIRA staff and advisers. I then present an overview of themes and sub-themes that emerged from semistructured interviews and focus group discussions with mothers, and semistructured interviews with MIRA field interviewers and Hetauda district hospital midwives, with each theme subsequently expanded and supported by textual data from transcripts. Discrepant and unique cases are also discussed.

I consider the secondary objective of the chapter, to determine which sorts of behaviours and responses were categorised as discarding or not of colostrum, in a separate section. This is followed by a consideration of the limitations of the study and problems faced. The chapter concludes with a synthesis.

A clear dichotomy in positive and negative perceptions of first milk, and specifically of colostrum (as opposed to 'khil' described in the chapter), was observed. This in turn was largely related to the specific practices that a mother reported; it was typically clear that some behaviours could be considered as 'discarding' and some as 'not discarding', with relatively little ambiguity. Addressing the secondary objective of the chapter, interviewers reported little difficulty in classifying mothers' responses as discarding or not during the MIRA surveillance. Overall, the closed binary wording of the MIRA surveillance question on colostrum discarding appeared valid. Mothers, however, sometimes reported discarding only a small amount of their first milk, and the discarding of some colostrum does not necessarily mean that all colostrum is withheld from the newborn infant. The question remains of why such strong quantitative effects were observed in Chapters 5 and 6.

7.1 RATIONALE FOR INCLUSION OF A QUESTION ON DISCARDING OF FIRST MILK BEFORE INITIATION OF BREASTFEEDING

After refinement of initial questionnaires piloted in 2000, the MIRA Makwanpur study included a question that can be translated as “before feeding the baby for the first time, did you squeeze and throw milk?” From the beginning of Phase I surveillance, this question was asked in addition to questions on breastfeeding initiation time and prelacteal feeding. In Phase II, the question was slightly altered, with the addition of one word: “before feeding the baby for the first time, did you squeeze and throw *bigouti* [colostrum] milk?”

The staff and technical advisers working with MIRA were aware that (i) globally, women sometimes delay the initiation of breastfeeding until after the second or third day postpartum, and (ii) in Makwanpur, mothers might have been discarding foremilk before their first feed or before every feed[330]. Initial questionnaire piloting identified that responses to questions about breastfeeding initiation time and discarding of milk appeared to be separate from each other, and the question on milk discarding was refined to specify discarding of first milk before the initiation of any breastfeeding as opposed to discarding of foremilk before every feed.

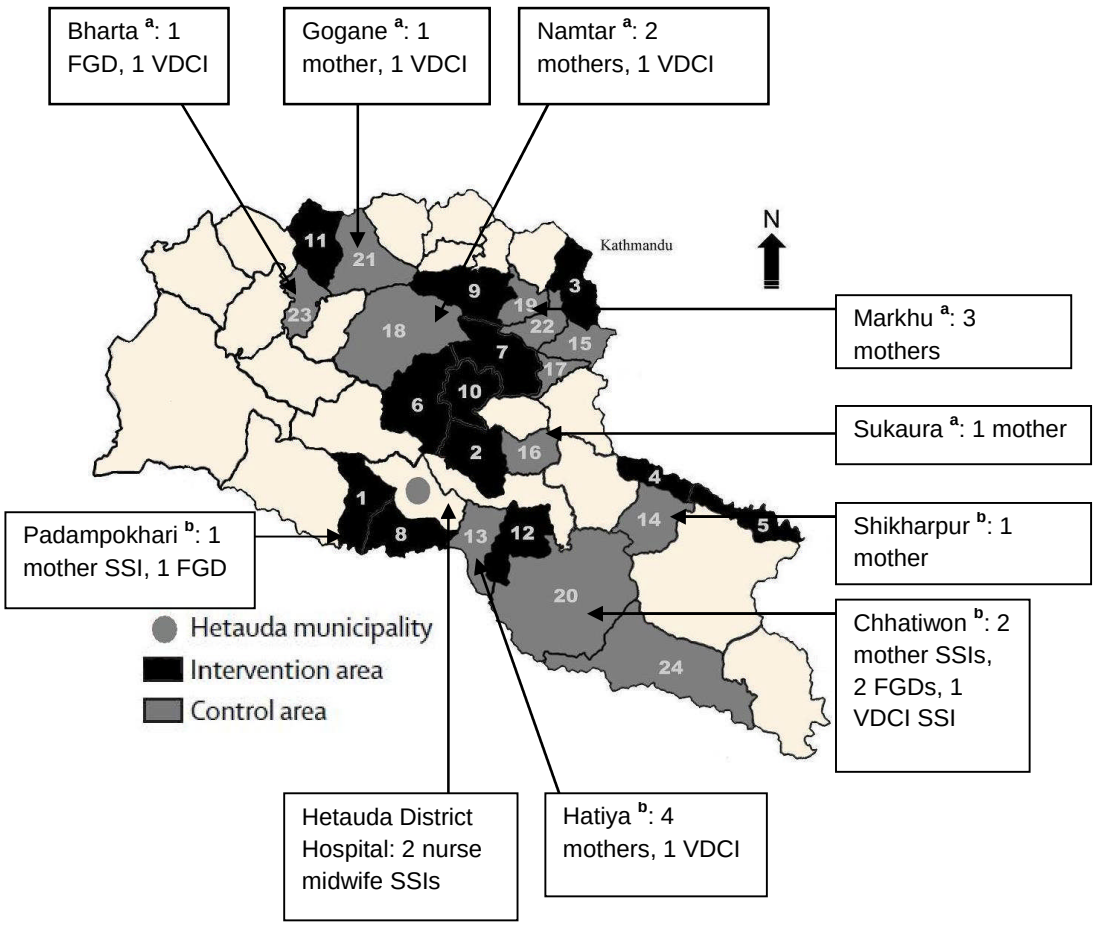
It appears that the survey question of interest on discarding of first milk was included on the informed notion that mothers may have been discarding some of their first breastmilk before initiation of breastfeeding, but with no detailed knowledge of what underlying behaviours might exist or how widespread they might be.

7.2 PRIMARY ANALYSIS AND RESULTS – BELIEFS AND PRACTICES RELATED TO THE DISCARDING OF COLOSTRUM

7.2.1 Summary

In total, semistructured interviews (SSIs) were conducted with 15 mothers (Figure 4.2), five VDC Interviewer key informants, and two nurse midwife key informants in Hetauda district hospital. Four focus group discussions (FGDs) were conducted, in which data were collected from a total of 35 mothers. There were no refusals to participate. The geographic dispersal of data collection is shown in Figure 7.1. Appendix H presents a selection of transcripts from interviews and FGDs.

Figure 7.1: Sources of qualitative data by village development committee, Makwanpur district

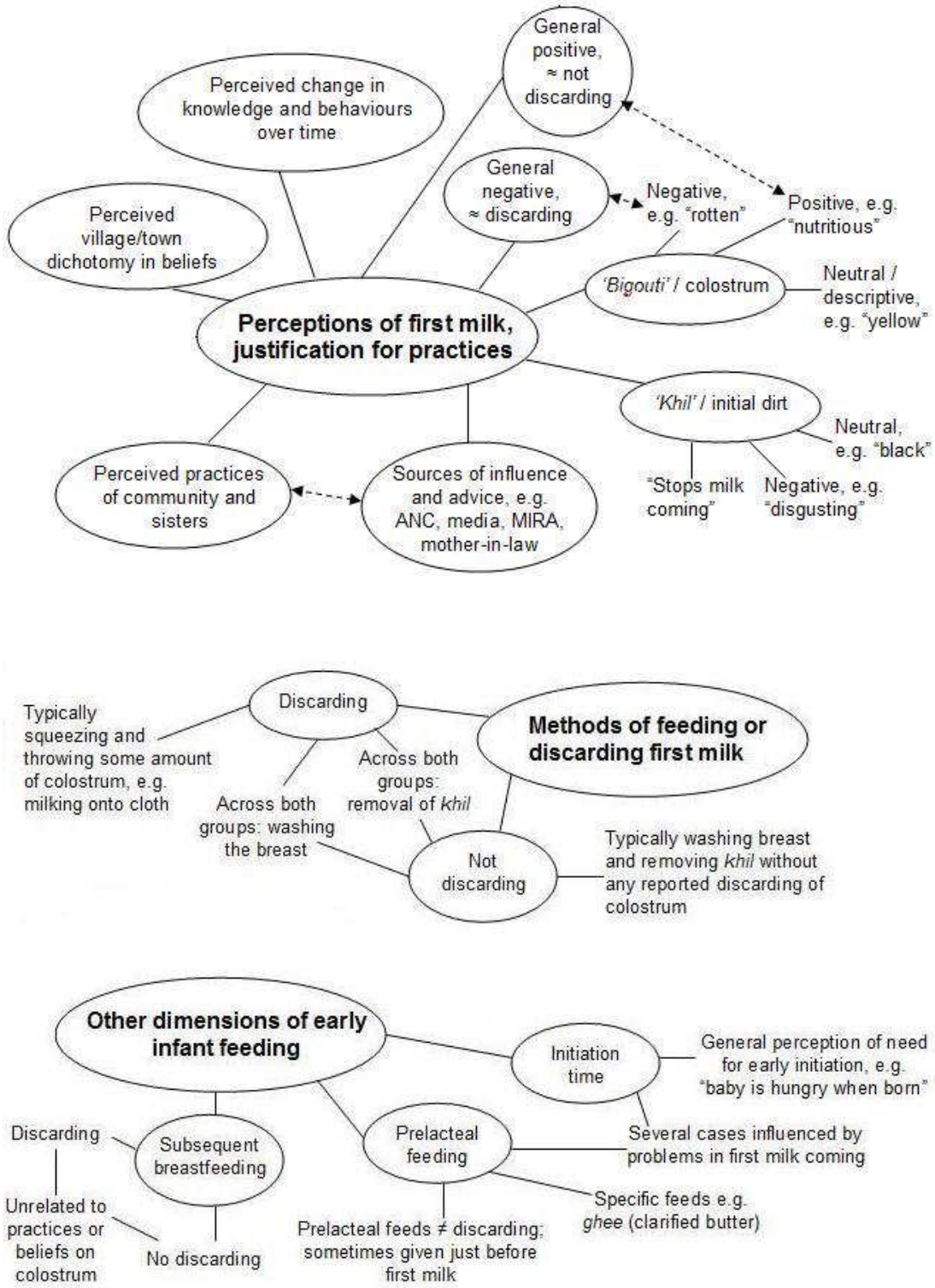


[a] Bharta, Gogane, Namtar, Markhu and Sukaura are hill VDCs

[b] Shikharpur, Chhatiwon, Hatiya and Padampokhari are low VDCs

A number of hierarchical themes and sub-themes emerged across the data sources as they were triangulated, often dictated by the questions asked in the topic guides. These are modelled in Figure 7.2, and each one is expanded upon throughout this section of the thesis.

Figure 7.2: Model of thematic groupings addressing the primary qualitative objective



Perceptions of first milk and justifications for practices. There was a dichotomy of positive and negative perceptions towards first milk, which appeared to be related to whether or not a mother reported discarding colostrum in earlier MIRA Makwanpur surveillance, although specific beliefs varied. A distinction between two aspects of first milk was necessary; *'khil'* was almost universally perceived as a blockage of dirt preventing milk from coming (and it is debateable whether this can be considered as milk at all), while *'bigouti'* can be considered to be a direct translation of 'colostrum', as it was frequently described as 'yellow' or 'thick' by mothers. Mothers typically expressed either positive or negative sentiments towards colostrum, regardless of their attitude to 'khil'. While a range of specific practices were described for what mothers did, there tended to be little ambiguity in whether a mother could be considered as having discarded her first milk or not, albeit with some exceptions. Attitudes towards first milk and colostrum appeared to demonstrate some geographical clustering; focus group discussions (organised where a sufficient number of recent mothers living in close proximity could be located) tended to comprise almost exclusively mothers who either discarded or did not discard first milk.

An unanticipated but salient theme that emerged during interviews and FGDs was that of a perceived change in practices and beliefs over time. This was shared by mothers, hospital staff and VDC Interviewers. Such reports are congruent with the secular trend of declining colostrum discarding over the past decade that was observed in Figure 5.4. A mother's wider community and elders, her mother-in-law, sisters, neighbours and other family members, medical staff including FCHVs, and the MIRA women's groups, were all discussed as sources of information about colostrum, sometimes conveying positive perceptions and sometimes negative.

Methods of feeding or discarding first milk. On specific behaviours related to what mothers did with their first milk, there was little ambiguity in whether they described practices that could be considered as discarding or not (Figure 7.2, second thematic area); mothers frequently made reference to washing the breast and discarding *khil*, regardless of whether they were categorised as having discarded or not in earlier MIRA surveillance, but those who verbally reported

‘squeezing’ or ‘throwing away’ some of their first milk were (usually) categorised as discarders in the surveillance.

Other dimensions of early infant feeding. Prelacteal feeding, breastfeeding initiation time, and discarding of milk before subsequent breastfeeding in the days following birth all emerged as topics distinct from colostrum discarding, with some discussion of specific behaviours and beliefs underlying the practices. In particular, discarding of milk before each feed appeared to be a separate but significant practice in its own right, and future research on the dynamics and effects of early infant feeding may benefit from consideration of this additional dimension.

In this section, where described themes are supported by examples from the interview or FGD transcripts, quoted text is unaltered from the translations made by the Research Assistant. Quoted examples are therefore often word-for-word translations from Nepali, and not necessarily expressed with an anglicised choice of words and grammar.

7.2.2 Positive (and neutral) perceptions of first milk and colostrum

Words which directly translate to 'first milk' were frequently used during interviews and FGDs, in addition to the word '*bigouti*' which equates to colostrum. Mothers' perceptions of 'first milk' were analysed separately from 'colostrum', in order to avoid potentially invalid interpretation by assuming that in all cases one term necessarily equated to the other according to the perceptions of mothers and key informant interviewees. However, there was much overlap in the positive themes expressed for 'first milk' and 'colostrum', and the two terms often appeared together or were used interchangeably by mothers. A further reason why 'first milk' was not automatically equated to colostrum during analysis was because there was a risk that when a mother described 'first milk', she may have included *khil* in her definition of first milk, and so the term has a potentially broader meaning than colostrum. And whereas discussion of 'first milk' generated rich data on positive and negative perceptions that may go towards explaining discarding behaviour, discussion of *bigouti* specifically tended to invite more basic description of its physical properties, such as its being 'yellow', 'thick' or 'sticky'. Treatment of *bigouti* separately from 'first milk' also allowed distinction between beliefs specifically about *bigouti* (colostrum) and *khil* (initial dirt), whereas such disambiguation is not possible if only 'first milk' is referred to. Care was taken by the research assistant during translation to write 'first milk' in English transcripts when a mother had literally said 'first milk' (*pahilo dudh*), and to write 'colostrum' when a mother had said *bigouti*.

'First milk'. When describing 'first milk', four positive themes about its perception emerged, and these were typically (but not always) articulated by the mothers who had not previously reported colostrum discarding in MIRA surveillance:

1. Promotion of health and protection from disease in the newborn infant (17 references across nine sources). Mothers frequently argued that first milk played a large role in preventing illness. For example, Participant 6 made the following contribution:

"It should not be thrown at all. Even if she throws, supposing if she throws, the baby may get any kinds of bad diseases, I think. I feel like that. Why to throw?"
– Participant 6 (Hatiya VDC)

Similar sentiments were expressed by Participant 11:

"That first milk, when it [the breast] is washed and given, I felt that the baby will have the power to fight diseases that's why I fed"

– Participant 11 (Namtar VDC)

2. Conferral of strength or power, and making the newborn infant 'big' (six references from six sources). For example, Participant 5 argued:

"The milk must be fed. It gives you strength. That first milk. They say that."

– Participant 5 (Hatiya VDC)

3. Nutrition; mothers frequently described first milk as containing vitamins or otherwise being nutritious (10 references across six sources). Again, an example highlighting this point can be selected:

Mother 1: "The first milk is nutritious, it must not be thrown."

…

Mother 7: "The first milk must be fed. It will be nutritious for the baby".

– Focus Group Discussion, Chhatiwon VDC, Ward 1

4. A further broad thematic category was one of general positive sentiment, with participants frequently describing first milk as being "nice" or "good" for the newborn infant, or simply that "it must not be thrown" (19 references across 10 sources). For example, dialogue from the SSI with Participant 9 went as follows:

Mother: "I think feeding is the best way. Not throwing."

Interviewer: "Why is it so?"

Mother: "Because they say it will be nice."

Interviewer: "Nice in the sense?"

Mother: "People say you must feed and must not throw".

– Participant 9 (Padampokhari VDC)

In addition, one mother (Participant 3) argued that her own health would be negatively affected if she did not feed first milk, although there was ambiguity over whether she was specifically referring to first milk or breastfeeding in general. Since this sentiment was only expressed once, it is difficult to assess whether it represented a unique case or a less frequently occurring theme.

Colostrum. Positive descriptions of *bigouti* largely overlapped with those for 'first milk', with several mothers using the terms interchangeably. The four themes were equally applicable to colostrum. For example, in agreement with the theme (1) that colostrum is often perceived by mothers to offer protection from disease, a VDCI in a region where relatively few mothers discard colostrum told the research assistant:

"There are mothers who have understood, they find the bigouti milk an equal of holy water, and that it has the resistance to fight diseases in babies."

– VDCI key informant 2

Examples can be used to support theme 2 in this context, equating colostrum to conferral of strength, power or size. When asked the question "as soon as you washed [your breast] with hot water, you fed the baby – why did you do this?", Participant 13 replied:

"So that the baby will be big and strong (laughter)."

– Participant 13 (Gogane VDC) [a]

[a] In this specific instance the mother experienced problems in her initiation of breastfeeding, adding complication to how her reports of discarding or not of colostrum should be interpreted. This is an issue discussed in further detail in Section 7.4.

And supporting theme 3 above, equating colostrum to conferring nutrition to the newborn infant, Participant 1 reported:

"That yellow milk is nutritious. I knew that from the beginning itself and I didn't throw… It's good."

– Participant 1 (Markhu VDC)

Further general positive statements (theme 4 above) were often expressed, such as the following:

"Even before, when I had not given birth, I heard that bigouti milk must not be thrown, and that the milk is very good for the baby."

– Participant 3 (Markhu VDC)

However, discussion specifically of colostrum also highlighted more nuanced information about how it was perceived by mothers. Explaining why she felt the thickness of colostrum may lead other mothers to discard it, Participant 6 told the research assistant:

> *"Bigouti milk is thick. Because it is thick people throw that. But the throwing never came in my decision… It is also milk, it's just that it comes thick."*
>
> *– Participant 6 (Hatiya VDC)*

It is notable, however, that no mothers themselves reported discarding colostrum because of its thickness.

Neutral adjectives often arose in mothers' description of colostrum. The most frequently occurring words used were 'yellow' (19 occurrences) and 'thick' (59 occurrences). Other descriptions of colostrum included 'sticky', 'like ghee', 'like glue', 'white' and 'sweet'. The conclusion can be drawn that when mothers were describing *bigouti*, a direct translation to 'colostrum' was appropriate.

Mothers occasionally expressed no opinion or knowledge of colostrum. They either had not heard of *bigouti*, or declined to express any opinion on it. Below is an excerpt from dialogue with Participant 4:

> *Interviewer: "And for you, what is bigouti milk?"*
>
> *Mother: "I don't know that. But I have heard of the word bigouti milk."*
>
> *– Participant 6 (Hatiya VDC)*

In the same vein, one VDCI argued that mothers did not necessarily have any opinions or beliefs on colostrum that preceded their decision to discard or not:

> *"Some mothers, even if they haven't understood [the benefit of colostrum], they clean and tidy themselves and feed the baby immediately. 'And we fed, and we didn't squeeze and throw the milk'… they used to say that."*
>
> *– VDCI key informant 2*

7.2.3 Negative perceptions of first milk and colostrum

Themes common to 'first milk' and 'colostrum'. Several themes of negative perception of first milk and colostrum also emerged, and there was such a degree of overlap that they are presented together. When describing 'first milk' or *bigouti*, four negative themes emerged, and these were typically (but not always) articulated by mothers who had previously reported colostrum discarding in MIRA surveillance:

1. Evil spirits. A particularly striking explanation for why first milk should be discarded was that evil spirits may enter the infant if he or she is fed (six references across five sources). Such a theme invites comparison with accounts from other cultures. Participant 7 explained:

> *"At first, only in the beginning when the baby is born, it [the breast] is washed, and after that to feed. (Laughs). So that the evil spirits won't enter the baby, a little bit of milk is squeezed and thrown. And after that it is fed. It's a tradition from earlier times."*
>
> *– Participant 7 (Hatiya VDC)*

In addition to other mothers giving comparable reports, two VDCIs corroborated the impression that women were sometimes discarding first milk in order to prevent evil spirits entering the infant:

> *"So that the evil spirits won't enter the baby, they offer the first milk. So that the evil spirits won't enter the baby, I have seen the mothers squeeze and throw away the milk before feeding the baby. Like that way they feed the baby."*
>
> *– VDCI key informant 1*

"And even until now, in the villages, they squeeze and throw the first milk because they say that the evil spirits come. The women are doing this even until now."

– VDCI key informant 2

2. First milk and colostrum causing diarrhoea or other illness. In direct contrast to the mothers who regarded 'first milk' as protective against disease, several mothers reported their feeling that colostrum causes disease (eight references across five sources). Arguably related to this theme was the occasional description of first milk as well as colostrum as 'pus' or a pimple. Participant 15 provided particularly rich data in this respect, saying the following:

"This bigouti milk must not be milked and given, I thought in my own heart. Like this bigouti milk must not be given. I thought it might cause illness and unhealthiness and so I milked bigouti milk and threw it, and [then after throwing some away] gave it... This makes me unhealthy and the baby will be unhealthy as well… In my own heart, I myself used to feel scared."

– Participant 15 (Namtar VDC)

One of the nurse midwife key informants of Hetauda district hospital corroborated that several mothers expressed comparable feelings:

"And this is bigouti milk is what they say. I have seen them throw because they say that the baby will be unhealthy."

– Nurse 1, Hetauda District Hospital

3. First milk and colostrum as ‘dirt’. When discussing specifically ‘first milk’, difficulties were encountered in disambiguating this theme from perceptions of *khil.* However, there seemed to be some instances in which ‘first milk’ was likened by mothers to dirt. Participant 14 provided a potential example:

“I believe the dirt is collected on top of the breast. And after two [squeezes] are thrown, the dirt will go away, and this way the dirt doesn’t go in baby’s mouth. That is why it was throw like that way, and the baby was fed.”

– Participant 14 (Shikharpur VDC)

Comparably, Participant 8 reported:

“The first milk that comes, we should squeeze and throw the dirt and after washing the dirt, we must feed.”

– Participant 8 (Chhatiwon VDC)

Bigouti was more clearly described by mothers as dirt, whereas this had been somewhat ambiguous for ‘first milk’. For example, talking about colostrum, participants at an FGD in Chhatiwon said:

Mother 2: “I find it like dirt.”

Mother 1: “Thick milk, I find it like dirt (laughter).”

– Focus Group Discussion, Chhatiwon VDC, Ward 9

4. A last theme comprised general sentiments that discarding of first milk was good for the infant (six references across four sources). For example, it was sometimes necessary for an observer to translate what was said by Tamang

mothers in an FGD where no mothers spoke Nepali as a first language, and synthesising the discussion between the Tamang mothers, the observer reported:

> *"So that the baby will be nice, to squeeze the bigouti milk, and to throw it, and then to feed."*
>
> *– Focus Group Discussion, Chhatiwon VDC, Ward 9*

Further perceptions of colostrum. Further vocabulary specific to colostrum was used, that was not used when broadly talking about first milk. In particular, in several instances colostrum was described as 'spoilt' or 'rotten' in addition to broader sentiments that it causes disease. Participant 14 explained the following:

> *"The milk is spoiled. And that milk is known as bigouti."*
>
> *– Participant 14 (Shikharpur VDC)*

Participant 7 conveyed a comparable feeling:

> *"Don't feed the first spoiled milk that was said. The ripe bigouti milk will affect the baby, they said… and now I also said, dai [to the VDCI during MIRA surveillance], it was spoilt and I also threw it. Otherwise it wasn't supposed to be thrown at the beginning, I said to dai [to the VDCI]."*
>
> *– Participant 7 (Hatiya VDC)*

Overall, there was arguably a dichotomy between positive and negative perceptions of 'first milk' and colostrum, which appeared to largely coincide with whether a mother had been recorded as having discarded colostrum or not in earlier MIRA surveillance.

7.2.4 Perceptions of 'khil'

While *khil* was a topic specifically probed towards the end of SSIs and FGDs if necessary, mothers frequently introduced the word into discussion autonomously. *Khil* was almost universally perceived as either dirt or a blockage preventing the flow of breastmilk, and nearly all mothers reported washing it away if they mentioned it, regardless of whether they were recorded as having discarded first milk or not in the MIRA surveillance. This section considers basic adjectives used to describe *khil,* and elaborates upon themes whereby it was generally perceived negatively or as a blockage preventing lactation.

Objective description. Since *khil* only has the approximate translation from Nepali to English as a 'cork' or 'plug', one task was to establish what its physical nature and descriptive properties were, in addition to more subjective reports of what it represents. Specific adjectives frequently used to describe *khil* included 'black' (22 occurrences), 'small' (33 occurrences) and 'solid' (seven occurrences). Less frequently, *khil* was described as 'round', 'frozen', or like a 'rice grain'.

Based on these adjectives alone, *khil* does not appear to equate with colostrum, and consideration of further data suggests that mothers generally made a distinction between the two. For example, Participant 11 told the research assistant:

> *"The difference between them… Bigouti milk is thick and yellowish in colour. And khil is small round one. It's very tiny."*
>
> *– Participant 11 (Namtar VDC)*

Another mother in an FGD in Chhatiwon simply said:

"Khil is black, and bigouti is yellow (laughs)."

– Focus Group Discussion, Chhatiwon VDC, Ward 1

Negative perceptions of *khil*. Mothers almost universally reported negative perceptions of *khil*, often with disgust. There was no clear systematic difference in sentiments expressed by mothers who had discarded or not discarded colostrum according to the earlier MIRA surveillance, suggesting that it was entirely possible to simultaneously regard *khil* negatively and colostrum positively. It was frequently equated to 'dirt' or 'pimples', or was believed to cause ill health in the newborn infant, although often little more was said by a mother other than words to the effect of '*khil* should be squeezed and thrown'.

Several of these ideas were encompassed at once in discussion during an FGD amongst Praja mothers in a remote area of Bharta VDC:

Unidentified mother: "In this breast, in this breast's nipple, the khil is to be thrown, milked and then it has to be thrown."

…

Unidentified mother: "Khil is that black in colour, which is supposed to be thrown."

…

Unidentified mother: "Now there is dirt and if the same dirt is eaten, the baby will be unhealthy."

– Focus Group Discussion, Bharta VDC

Expressing disgust, Participant 5 concisely told the research assistant:

"I feel like khil is dirt. What else to say? ... I find it disgusting."

– Participant 5 (Hatiya VDC)

“It stops the milk coming”. With 10 references across seven sources, a salient theme was the description of *khil* as a blockage preventing the flow of breastmilk, with a need to wash it or remove it. Several examples can be selected to illustrate this point:

> *“After that khil is out, the milk started coming. Khil is the one that stays on the hole on top of the breast.”*
>
> *– Participant 2 (Markhu VDC)*

> *“If the khil is not gone, the milk doesn’t come.”*
>
> *– Participant 13 (Gogane VDC)*

> *“Khil means it is tiny and stays on the nipple of the breast. It could be glued to it as well. It must be taken out. We must take it out carefully. After taking that out only the bigouti milk comes.”*
>
> *– Participant 6 (Hatiya VDC)*

Positive discrepant case. There was one instance in which a mother gave a positive report of *khil*. Since data were collected from only 50 mothers through either interview or FGD, it is unclear whether this represents a rarely occurring sentiment or a somewhat unique case. Participant 11 said the following:

> *“While feeding khil, I feel something. I used to feel that something might happen. It’s said that khil shouldn’t be thrown. This time, I fed without even taking out the khil.”*
>
> *– Participant 11 (Namtar VDC)*

Overall, there was a clear tendency for nearly all mothers to believe that *khil* is a negative thing and should in some way be removed, regardless of what a woman's perception was of 'first milk'.

7.2.5 Perceived change in knowledge and behaviours over time

A theme that consistently emerged was one of a transition in knowledge and behaviours within living memory. There were 28 references to this across 14 sources. Although there were no hierarchical sub-themes identified for this category, contrast was made along more than one time-scale, from a less precise notion of what used to be done traditionally, to the impression of rapid change as some mothers described inter-generational contrast or even a change in their own practices from the birth of one child to the next. This theme is corroborated by the secular trend of improvement in rates of colostrum discarding over the past decade in Makwanpur that was described in Figure 5.4.

Several examples can be given of a general feeling that people in 'earlier times' had negative perceptions of colostrum that have given way to positive ones. For example, one mother in the FGD in Padampokhari VDC said:

> *"'People in the earlier times used to say that bigouti milk must not be fed and used to throw and they used to catch all kind of illness like malnutrition, cold and all. Like polio and all."*
>
> *– Focus Group Discussion, Padampokhari VDC*

Suggesting an inter-generational development, another mother said of colostrum:

"'It should be thrown after washing', that's what our mothers used to say before. 'At first the bigouti shouldn't be fed, it should be washed and thrown', people from earlier times, old men and women, had said. But they also came to know that that mustn't be done"

– Focus Group Discussion, Padampokhari VDC

Dialogue in one FGD suggested that a mother had changed her practices with first milk between the birth of one infant and the next (although care must be taken in interpretation as the interviewer asked several closed questions which directed the mother to reply with a 'yes' or 'no' answer):

Mother: "Before before I had thrown, and the later one, I had fed."

Interviewer: "Before before?"

Mother: "I didn't know before before, then what to do?"

Interviewer: "Do you mean to say, before, you threw the bigouti milk?"

Mother: "Yes!"

Interviewer: "… And to the baby after that you started feeding?"

Mother: "To the babies born after that [I started feeding]."

– Focus Group Discussion, Chhatiwon VDC, Ward 9

There was one discrepant case in which the participant argued that colostrum was seen as nutritious by previous generations but was now more regularly discarded. Articulating more detail than most participants, Participant 11 told the research assistant:

> *"The old men and women say that it's nutritious. And the people of today say that it has to be thrown. I don't know why they used to say that? It should be fed. I used to think that maybe something would happen. I used to think that it shouldn't be thrown. When people who knew more than me said why to throw, even we felt like why to throw, and so we fed."*
>
> *– Participant 11 (Namtar VDC)*

Arguably, a related minor theme was a dichotomy in beliefs held in villages compared to municipal areas, or between mothers giving birth institutionally rather than at home (four references across three sources). Ideas on this theme were posited by both interviewed nurses and one VDCI. For example, one nurse argued:

> *"Those who give birth in the hospital have that knowledge. [Those] who give [birth] outside won't have the knowledge… Those who give birth outside may have less health education. That's the difference I think."*
>
> *– Nurse 2, Hetauda District Hospital*

7.2.6 Sources of information and advice, and the perceived practices of sisters and the wider community

This area of evidence was to an extent directed by questions in the topic guides about whether mothers had received any advice during antenatal care visits or from people attending the birth, and what they felt their sisters or wider community had done with first milk. However, paradoxically, when mothers were directly asked if they had received advice, they frequently said that they had not, but later spontaneously made reference to (for example) the recommendations that their doctor or mother-in-law had given them. (Potentially, this suggested a discrepancy between what mothers considered to constitute advice, and the sort of advice they actually received).

Information and advice for mothers on what to do with first milk originated from a wide range of sources, including medical staff either at birth or during antenatal care visits (14 references across 10 sources), the MIRA women's groups (five references across three sources), the media (nine references across three sources), a mother's own mother (four references from four sources), a mother's mother-in-law (seven references across six sources), FCHVs (five references across three sources), and friends, neighbours and other family members. MIRA, FCHVs and the media were almost always associated with perceived recommendations to not discard any colostrum, while medical personnel, mothers and mothers-in-law, family, friends and neighbours were a more mixed source of information. Traditional birth attendants were not mentioned during the interviews and FGDs.

MIRA women's groups, FCHVs and the media: consistent sources of advice to not discard colostrum. Examples of advice to not discard colostrum, reported to originate from MIRA women's groups, FCHVs and the media, are shown below. Where MIRA women's groups were mentioned, it was always associated with recommendations to not discard first milk. The clearest example was:

> *"I went five or six times. MIRA's mother group that used to happen sometimes, from there too I learnt a lot. They used to talk a lot on mother and babies. And also that the first milk shouldn't be thrown. It shouldn't be squeezed and thrown."*
>
> *– Participant 3 (Markhu VDC)*

FCHVs were mentioned several times, although there was rarely an elaboration of any details they may have provided:

> *"Advice… I got from FCHV, from advertisement, and from everyone's mouth that after delivery the first milk must be fed. It must not be thrown and it was in my heart. So I fed that way."*
>
> *– Participant 2 (Markhu VDC)*

Media sources were varied; with mothers and nurse key informants mentioning information through news and advertisement on the radio as well as on television (Hetauda FM had a wide listener base across Makwanpur, and often included health promotion messages in its broadcasts). Such information sources may have been more accessible to wealthier households. While an example can be selected from a mother participant, feedback from the nurse interviews also supported the impression that wealthier households may have been more exposed to public messages to not discard first milk:

> *"According to me, what I have heard from the news, from advertisement, and after knowing from FCHV didi, the first milk that the baby drinks contains vitamins. And it has the ability to save the child."*
>
> *– Participant 2 (Markhu VDC)*

> *"If they are from bazaar they would already know that they have to feed because they listen to radios, they listen to television… Due to the influence of radio, television, it's less [discarding of colostrum less frequently occurs]."*
>
> *– Nurse 1, Hetauda District Hospital*

Medical staff, mothers' mothers and mothers-in-law, friends, other family and neighbours: mixed advice reported. Although women's groups, FCHVs and the media appeared to provide a consistent source of messages to not discard (and often also to initiate breastfeeding early), other sources of advice for mothers were more mixed. Several examples can be provided of the contrasting advice reported to originate from different nurses, doctors, mothers' own mothers and mothers-in-law, and wider family friends and neighbours.

The nurse midwife key informants themselves elaborated upon the advice they gave to mothers arriving for institutional delivery or antenatal check-up – both key informants recommended to mothers that they should not discard any of their first breastmilk, in addition to initiating breastfeeding early. One example was:

> *"After they have come to the hospital, since it's bigouti they are not allowed to throw right after giving birth because they are already informed that they should feed the milk by half an hour and not throw this yellow milk. This would have already been informed."*
>
> *– Nurse 1, Hetauda District Hospital*

In addition to nurse midwife key informants themselves describing that they and other medical staff regularly advised mothers not to discard their first breastmilk, these claims were sometimes corroborated by the reports of mothers. For example:

> *"And talking about milk, straight after giving birth, the doctor had advised me to make the baby suck milk. Because the doctor said to me to feed the bigouti milk, since I had heard from advertisement also, that first milk must be fed."*
>
> *– Participant 2 (Markhu VDC)*

> *"Yes the midwife didi. Dhan Maya didi had said that this [the first milk] is good, it must not be thrown and it must be fed… It does well for the baby. This milk must not be thrown, it should be fed."*
>
> *– Participant 6 (Hatiya VDC)*

However, there were also some reports of nurses or doctors advising mothers to discard their first milk:

> *"Here, in the beginning, the nurse lady had already said, when I had gone to put injections, that not to feed the first milk, to milk it first and then to wash and throw it. I did that only."*
>
> *– Participant 10 (Hatiya VDC)*

> *"After taking it out two or three sirka [squirts], and then washing it and then after doing that, we need to feed the milk, even the doctors had said, they said that, right? We are supposed to throw two or three sirka, and then we need to make them suck, they said in Chhatiwon."*
>
> *– Participant 14 (Shikharpur VDC)*

Mothers' own mothers were rarely and briefly referred to as a source of influence, since due to the patrilocal nature of most Nepali marriages, women often gave birth away from their own childhood family. One example can be selected to illustrate an instance where a mother's own mother advised no discarding, another example where discarding was advised:

"Mummy used to say to feed the first milk. First milk means it contains vitamins."

– Participant 2 (Markhu VDC)

Mother: "Own mother and didi and all were there [at the birth]."

Interviewer: "And had they given you any advice on first milk?"

Mother: "Throw little bit and then feed the baby, they used to say."

– Focus Group Discussion, Chhatiwon VDC, Ward 9

Although less prevalent than anticipated by the researcher, mothers-in-law provided a more significant source of advice, again mixed according to different sources. However, the majority of references to mothers-in-law suggested they generally held colostrum in high regard. One interview with a mother suggested that her mother-in-law had offered advice on prelacteal feeding as well as on not discarding the first milk:

Interviewer: "Oh sasu [mother-in-law] was there? Oh. And from your sasu, had you received any advice on what you should do with the first milk?"

Mother: "She had said to wash and feed… The baby must be fed with milk immediately, she had said. And to feed the baby ghee, honey."

– Participant 13 (Gogane VDC)

One nurse key informant gave the impression – which was a suspicion shared by the researcher prior to the study – that the instruction of mothers-in-law to discard may supersede any other feelings held by the mother, since mothers-in-law are considered of higher status and are a dominant and prescriptive influence in the lives of many young Nepali mothers:

> *"At home also the daughter-in-law gives birth and with the mother-in-law… The mother-in-law, when she says to throw, they don't question why."*
>
> *– Nurse 1, Hetauda District Hospital*

There were, however, no corroborating instances of mothers reporting in interview that their mother-in-law told them to discard colostrum (perhaps this could have partially been due to the fact that interviews were often conducted in the presence of, or earshot of, that same mother-in-law). Overall, mothers-in-law appeared to hold colostrum in high regard – a conclusion in agreement with that of a previous Masters thesis study of perceptions of Tamang grandmothers in Makwanpur[216]– with only one source suggesting otherwise.

Friends, neighbours and wider family members also frequently attended births. There were occasional reports of their offering recommendations to mothers, either during pregnancy or at the time of birth, and those recommendations were mixed.

For example, Participant 7 told the research assistant of advice she received to adopt practices that may be considered as not discarding:

Mother: "[I was told] nothing much, just that It should be washed with hot water, and after washing to feed. Only that much. And nothing else."

Interviewer: "Oh. And from whom and where did you hear that?"

Mother: "The family members. Who else would say that? I had seen the others doing also. I had also seen the other women doing also. And even my own self I had thought that much, that it should be washed and fed."

– Participant 7 (Hatiya VDC)

In contrast, following the advice of a neighbour to discard, Participant 12 told the research assistant:

Mother: "That Ghalan's wife had said to throw and then to wash. And so I washed and fed daughter… I threw… That Ghalan's wife said like that."

– Participant 12 (Sukaura VDC)

Siblings and perceived practices of wider community. Mothers typically did not know what their sisters did with their first milk, as Nepali society is largely patrilocal, causing sisters to become geographically dispersed after marriage, often with the opportunity only to see each other during times of festival. A few mothers ventured guesses about their siblings, which matched what a mother herself felt about first milk.

Reports of what was believed or practised in the surrounding community varied. Several participants made non-specific reference to 'the others', 'the other mothers',

or the practices that 'they' do, which were interpreted as perceptions of what mothers in the general area were doing with their first milk. Some mothers perceived the wider community to not discard colostrum:

> *"That milk should be fed. The mothers used to say that the milk should be fed, so I fed."*
>
> *– Participant 4 (Chhatiwon VDC)*

Others felt that discarding was common:

> *Interviewer: "In your neighbourhood, do you know what the mothers are doing with their first milk before breastfeeding their baby for the first time?"*
>
> *…*
>
> *Mother: "They wash, they wash with water, and they throw the bigouti milk and then they give."*
>
> *– Participant 15 (Namtar VDC)*

A further related sub-theme that was coded for in the data was one of 'tradition and culture', which broadly may be considered to relate to perceptions of practices in the wider community as well as the earlier described theme of change in perceptions over time. There was considerable overlap with these other themes and so no examples are provided.

7.2.7 Methods of feeding or discarding first milk

Prior to the study, it was hypothesised that mothers in Makwanpur may be practising a range of behaviours, and that a closed binary questionnaire item captured no detail in what mothers were doing with their first milk, and may be inappropriate. While discussion of concepts such as *khil* revealed there was some nuance to what could be considered as discarding of first milk in the quantitative data, since nearly all mothers removed *khil* regardless of whether they were classified as discarding or not, it was also generally not problematic to broadly identify from verbal accounts whether some first milk had been discarded or not. From the accounts of the participants, a dichotomous classification of whether a mother had discarded some amount of colostrum or not appeared to be valid.

Women who had not discarded according to MIRA surveillance typically reported washing or heating their breast or otherwise bathing first, although not always, and removed *khil* either through washing or extraction, although not always, and then directly fed their infant. Women who were recorded as discarders described much the same variability in practices postpartum, with the exception that they frequently made reference to ‘squeezing’, ‘throwing’ or ‘milking’ away some of their first milk. The key difference was simply whether or not a mother reported discarding some of her first milk.

Feeding with no discarding. There were 43 references across 13 sources to practices that could broadly be considered as ‘not discarding’. Some examples of these are shown below.

By far the most commonly reported series of practices was for mothers to wash their breast with hot water, remove *khil*, and then directly feed their infant without discarding any colostrum. For example:

Mother 3: "After giving birth I was advised that we should clean [the breast] with hot water, and feed the baby with bigouti milk and not throw it… and so I fed the baby."

…

Mother 9: "I also washed with hot water, and first I removed the khil from the nipple and fed the baby with bigouti milk."

…

Mother 8: "I washed it with hot water, threw the khil and fed the baby."

– Focus Group Discussion, Padampokhari VDC: prior colostrum discarding status unknown

"To me, the breast's holes must be opened, at first it is closed. After we give birth, the milk must come. But since the khil is there, it is difficult to break it [make an opening]. So it has to be cleaned slowly with hot water and then remove it. And then the breast opens, and after that we have to feed... Yes I fed. I threw the khil and I fed the baby."

– Participant 6 (Hatiya VDC): recorded as not discarding colostrum in MIRA surveillance

However, mothers did not always mention *khil*, whereas washing appeared to be more universal:

"We have to wash the bigouti milk with hot water. We must not throw the bigouti milk. They gave that advice [at ANC check-up]."

– Participant 5 (Hatiya VDC): recorded as not discarding colostrum in MIRA surveillance

When justified, reasons related to hygiene were sometimes cited as explanations for washing the breast before feeding:

> *"Before breastfeeding the baby, the breast must be washed with hot water, we must not feed straight away. There may be germs, because of delivery, there may be blood as well. So, it must be washed first. And after washing, we must have the baby suck it soon."*
>
> *– Participant 3 (Markhu VDC): recorded as not discarding colostrum in MIRA surveillance*

Other practices reported once only included heating the breasts and applying oil. One example, of applying oil (which also encompasses the other practices described above), was:

> *"I was told to take out the black part of the breast slowly slowly while bathing and I took it out. And I had taken it out, if I had taken it out then there would have been a possibility of having a sore there. Because I used to clean it while bathing, and I used to put little bit oil, and make it soft, after doing that it came [the khil came out]… if the baby is made to suck early, the milk also comes fast. I put oil on the breast and then the baby was able to suck milk and baby was able to take it."*
>
> *– Participant 1 (Markhu VDC): recorded as not discarding colostrum in MIRA surveillance*

Discarding. There were 59 references across 18 sources to description of practices that could broadly be considered as 'discarding'. These accounts originated either from a mother describing what she did herself, or otherwise a source describing what they felt other women were doing. Some examples of these are shown below.

While mothers frequently described washing the breast and removing *khil*, as was the case for women who had not discarded, additional reports of 'squeezing' and 'throwing' colostrum or first milk were typically included in the accounts of mothers recorded as having discarded colostrum according to MIRA surveillance.

Some mothers described discarding some of their first milk in unembellished terms, followed by feeding:

> *"I squeezed the milk and fed."*
>
> *– Focus Group Discussion, Chhatiwon VDC, Ward 9: this mother was recorded as having discarded colostrum in MIRA surveillance*

> *"First, I squeezed like this and then only fed the baby."*
>
> *– Participant 8 (Hatiya VDC): recorded as having discarded colostrum in MIRA surveillance*

Others appeared to wash their breast after discarding some colostrum:

> *"At first I threw, ok? First I threw the milk, and then I washed the breast, and fed the baby… first the milk was thrown, and later the breast was washed."*
>
> *– Participant 10 (Hatiya VDC): recorded as having discarded colostrum in MIRA surveillance*

> *"I felt that bigouti milk shouldn't be [fed]. It makes unhealthy. I thought like that. So I milked the bigouti milk, washed with the hot water and gave."*
>
> *– Participant 15 (Namtar VDC): recorded as having discarded colostrum in MIRA surveillance*

Washing was also often reported to take place before any discarding, and other practices reported once only included milking colostrum on to a cloth, and rubbing the breast:

"After milking on the cloth, I threw it, and then I washed it with hot water and fed the baby… wash it with hot water, after washing, milk it on the cloth, and then throw it… I washed it, and then I milked the bigouti milk and threw it and after that I fed the baby."

– Participant 10 (Hatiya VDC): recorded as having discarded colostrum in MIRA surveillance

"I washed with hot water, and then squeezed, and rubbed it [the breast] hard and fed."

– Participant 7 (Hatiya VDC): recorded as having discarded colostrum in MIRA surveillance

Several sources made reference to '*sirka*', which was broadly interpreted to mean 'squeezes' or 'squirts'. With this interpretation, it appeared that some mothers were discarding by removing several units (squeezes) of their first milk:

Mother: "Two sirka means two sirka comes, while squeezing, right? That I threw, ok?"

…

Interviewer: "So, what do you mean by two sirka?"

Mother: "It's sirka, sirka. It's supposed to be called sirka. When the breast is squeezed like this, doesn't the sirka come out? When the milk is being fed, it drops."

– Participant 14 (Shikharpur VDC): recorded as having discarded colostrum in MIRA surveillance

Speaking of what mothers sometimes told him at the time of MIRA surveillance questioning on first milk, one VDCI reported:

> *"'I used to feed the milk only after throwing two or three sirka in the beginning.' They [the mothers] had said that… After throwing khil, two or three sirka, four or five sirka is thrown."*
>
> *– VDCI key informant 3*

Overall, there was a clear dichotomy in practices that could be considered as 'discarding' or 'not discarding' first milk, and little interpretation was required to understand what was meant in each instance; some mothers reported 'squeezing' and 'throwing' some of their first milk, others didn't, and their reports largely agreed with what was recorded for them in prior MIRA surveillance.

7.2.8 Other dimensions of early infant feeding

What is less clear is how 'squeezing and throwing' of two or even five or six units (or squirts) of colostrum could lead to the significant impacts on neonatal mortality risk observed in Chapters 5 and 6. If the discarding of colostrum does not necessarily equate with delayed initiation time or prelacteal feeding, as was suggested early in Chapter 5, then presumably infants can still receive some colostrum early postpartum even if their mothers discard some of the first milk. It is not necessarily valid to argue that discarding colostrum is the same thing as withholding it for several days after birth, and this is unlikely to be a major explanation for why discarding colostrum had a discernible impact on neonatal mortality risk in Makwanpur at least. Section 1.5 of the introduction highlighted that the volume of breastmilk produced in the first days postpartum is small, and that it has a unique composition and immunological role. As a result, a significant impact of discarding even a small volume of colostrum might reasonably be anticipated, and this point is expanded in the discussion of Section 8.3.

In trying to address the primary qualitative objective of the thesis - to describe the nature of and reasons behind practices and behaviours related to first breastmilk - attention was also paid to other dimensions of early infant feeding.

Breastfeeding initiation time. This was not a topic specifically probed in interviews. However, when it was spontaneously introduced by mothers, their sentiment usually appeared to be that early initiation of feeding was preferred, with several arguing that delayed initiation causes the infant's throat to become dry, that they will 'forget how to suck milk', or that the infant is born hungry. In addition, it appeared plausible that a mother could stress the importance of early initiation while also discarding some of the first milk, suggesting that they are separate dimensions physically and conceptually. Several examples illustrate these points.

Expressing concern that delayed initiation would cause the newborn infant to 'forget' how to feed, mothers in one FGD said:

> *Mother 4: "The baby will forget to suck milk. The milk must be given early."*
>
> *…*
>
> *Mother 9: "After you have delivered a baby and become a mother, when you do anything, you have to do fast fast, and you must not feed by doing late. The baby will forget to suck the milk. It must be given fast fast."*
>
> *– Focus Group Discussion, Bharta VDC*

In another FGD it was asserted that the infant is born hungry and so requires prompt feeding:

> *"After the baby is born, one thing that we assume is that the baby is hungry, and moreover the baby also cries. So we'll have to feed."*
>
> *– Focus Group Discussion, Chhatiwon VDC, Ward 1*

Similarly:

Interviewer: "And you fed the milk immediately, why did you do this?"

Mother: "It's said we have to feed… the baby will be hungry, it has to be fed, they say."

– Participant 7 (Hatiya VDC)

Several elements of dialogue suggested that it was possible for mothers to discard some colostrum while also initiating early. One mother suggested that other women in her community were initiating feeding after one hour, while also discarding colostrum:

Mother: "What they do is, they don't feed milk for one hour."

Interviewer: "After giving birth?"

Mother: "Yes, they don't milk for one hour."

Interviewer: "And then?"

Mother: "And they give."

…

Interviewer: "They give and what do they do with their milk before breastfeeding the baby?"

Mother: "They wash, they wash with water, and they throw the bigouti milk and then they give."

– Participant 15 (Namtar VDC)

Another mother stated that she discarded colostrum and then initiated feeding after approximately half an hour to an hour (although again interpretation must be made with caution as the interviewer directed potential responses with closed questions):

> *Interviewer: "You took the milk out on the cloth and you threw the milk?"*
>
> *Mother: "Yes."*
>
> *Interviewer: "Oh. And after how long did you feed the milk?"*
>
> *Mother: "One hour or half an hour after doing that."*
>
> *– Participant 10 (Hatiya VDC)*

There were, however, unusual instances in which colostrum discarding was suggestively linked with delayed initiation time, and the beliefs underlying one practice may have gone some way to explaining the other. One mother described how she discarded her first milk and waited only until the 'thinner milk' (which may be interpreted as the transitional milk coming after two to three days postpartum) before breastfeeding:

> *"To the children bigger than this, I washed the breast, the first thick milk, I milked and threw it. And when thinner milk used to come, I used to feed."*
>
> *– Participant 11 (Namtar VDC)*

However, in the above example it is unclear how long the mother waited for before feeding.

There was a further ambiguous suggestion in the same vein by one of the nurse midwife key informants, whereby it was unclear whether she was referring to mothers experiencing problems in the onset of lactation, or whether mothers had argued that the colostrum in the first two days is not milk:

> *"The people from my area have done maximum if they do throw. They do not feed the first milk. But they do not feed the milk the first two days itself. Because they say it doesn't come."*
>
> *– Nurse 1, Hetauda District Hospital*

Overall, the accounts from the qualitative methods corroborated the suggestion that colostrum discarding and breastfeeding initiation time may be treated as separate dimensions, at least in the context of Makwanpur.

Prelacteal feeding. Mothers at times described how they offered prelacteal feeds and why they did so, and attention was paid by the researcher to whether this had any relationship with colostrum discarding, either as an associated practice or stemming from the same underlying beliefs. In agreement with the data presented in Chapter 5, several mothers mentioned prelacteal feeds of honey, ghee, buffalo's milk, or sugar. One reason cited for providing prelacteal feeds was when mothers experienced a problem in the onset of lactation; in these instances the prelacteal feed may have been perceived as a substitute when mother's milk was not available. It appeared to be possible for a mother to give prelacteal feeds while also initiating early and not discarding colostrum. Data were, however, not very rich on this topic.

Some mothers suggested that they gave prelacteal feeds to their infants, and also initiated early, without mention of discarding colostrum:

> *"We have to mix everything, ghee, honey, sugar and then feed… it must be fed before anything… to feed right in the beginning, and after that that to feed the milk."*
>
> *– Participant 11 (Namtar VDC)*

> *Mother: "At first, the baby was fed with ghee, honey."*
>
> *…*
>
> *Interviewer: "Oh and did you feed the first milk right after then?"*
>
> *Mother: "Yes, right away."*
>
> *– Focus Group Discussion, Chhatiwon VDC, Ward 1*

One nurse suggested that specific castes or cultural groups in Makwanpur may display distinct practices of prelacteal feeding (although caution must be exercised in interpretation as this may have only been her impression of a group she rarely interacts with):

> *"It's like what caste they have like Muslims and all, they make the baby lick honey, and some make the baby lick sugar. I have seen that. They have to make the baby lick because it's their culture."*
>
> *– Nurse 1, Hetauda District Hospital*

Offerings such as ghee, sugar and honey serve as an initial 'taste' for an infant, whereas other types of milk may serve as a substitute for breastmilk. A significant

reason suggested by one mother for giving buffalo's milk as a prelacteal feed was a problem in the initiation of feeding:

> *Mother: "At first I cleaned with hot water. And any milk didn't even come out for three days."*
>
> *Interviewer: "And then what did you do?"*
>
> *Mother: "Buffalo's milk was bought and so fed the baby with it."*
>
> *– Focus Group Discussion, Padampokhari VDC*

This reasoning was corroborated by the reports of one nurse key informant:

> *"Mother's milk is not coming. We won't feed the mother's milk. So we have to feed the cow's and buffalo's milk, we have found that."*
>
> *– Nurse 2, Hetauda District Hospital*

Subsequent discarding of breastmilk in the days (and months) following birth. Mothers were also sometimes asked if they discarded their breastmilk in the subsequent days following birth, independently of whether they discarded their first milk. This line of enquiry suggested that discarding before later feeds may represent a further dimension of infant feeding worthy of investigation. Some mothers reported that they continued to discard some milk for several months, and one even reported that she continued to discard milk before each feed up until the time of visit for qualitative interview. Practices included squeezing or potentially washing and wiping the breast before each feed. Justification or explanation for this practice was sparse.

There was no evidence to suggest that what a mother chose to do with her colostrum was related to what she chose to do with her later breastmilk.

Several mothers described how they discarded milk before each feed. One mother appeared to do this until her infant was aged nine months. Another participant suggested she was still discarding milk up until the time of her interview:

> *"Before feeding, I throw every time… to throw little bit and to feed… and now also, I keep on lap. I wash, and then throw little bit and then only feed the baby."*
>
> *– Participant 12 (Sukaura VDC)*

There was also the suggestion on several occasions of washing the breast before each feed, although it was unclear whether this was necessarily associated with discarding:

> *"I used to wash the breast, or I used to wipe and clean even with the cloth or water. But directly I never used to feed, because there might be dirt, and then after that I used to feed milk."*
>
> *– Participant 2 (Markhu VDC)*

There was some evidence to suggest that just because a mother discarded her first milk, this did not necessarily mean she was discarding her subsequent breastmilk:

Mother: "First time squeezed and threw, and later on fed like that way."

Interviewer: "Like that way, meaning?"

Mother: "Like that way, without squeezing."

– Focus Group Discussion, Chhatiwon VDC, Ward 9

Overall, when the topic was brought up, sources generally agreed in saying that breastfeeding should be initiated shortly after birth, and while there was also some mention of prelacteal feeding, this appeared to be unrelated to a mother's feelings on discarding first milk. A further common practice became apparent over the course of the study, and later topic guides were altered to specifically probe about it; discarding of milk before subsequent feeds in the days following birth. This appeared to be unrelated to what a mother had said about her first milk, and may represent a further dimension of infant feeding in its own right.

7.3 SECONDARY ANALYSIS AND RESULTS – CATEGORISATION OF QUESTIONNAIRE RESPONSES IN MIRA SURVEILLANCE

A secondary objective of the qualitative investigation was to determine in which instances, or for which set of behaviours, VDCIs categorised mothers' responses as 'discarded' or 'not discarded' in the binary MIRA Makwanpur surveillance question "before feeding the baby for the first time, did you squeeze and throw *bigouti* milk?" The quantitative data of Chapters 5 and 6 suggested that mothers who were categorised as having discarded their first milk were at significantly increased risk of suffering the death of their infant in the neonatal period, but the nature of behaviours that fell under the categories 'didn't discard' or 'discarded' was unclear. It was also anticipated prior to the study that more than two categories could potentially have been appropriate if covering a full range of discrete behaviours in closed questionnaire items.

However, as has already been suggested in the results of Section 7.2, there was in fact a broad dichotomy in identifiable discrete behaviours, between mothers who discarded colostrum or not. Correspondingly, VDCIs reported little difficulty in interpreting responses and categorising a mother as having discarded or not, and there were consistent scenarios in which VDCIs had either classified a mother as having 'discarded' or 'not discarded' her first milk, with little (but potentially some) variation in how different VDCIs interpreted different responses from mothers. This section considers the qualitative evidence that was generated from scenarios in which VDCIs recounted that they had classified women as having discarded or not. It suggests that two categories were appropriate for classifying the responses of mothers.

At the most basic level, VDCIs reported that they classified a mother as having discarded if she responded that she had discarded, and having not discarded if she said she had not:

"Like when they used to say they threw, I considered it as 'threw', and tick it as 'threw'. And if they haven't thrown, 'didn't throw'."

– VDCI key informant 2

"And if they say, 'we used to feed after throwing', then we used to consider had thrown, and if they fed without throwing then we considered hadn't thrown. And from there, had and hadn't used to separate."

– VDCI key informant 3

Some VDCIs (and a field coordinator during piloting) even reacted with incredulity at being asked about the kinds of responses mothers gave, since mothers only had two available options in the questionnaire. VDCIs did, however, also often report using their own judgement or interpretation in order to classify the response of mothers, and there was some range in the behaviours that fell under the category of 'discarding'; some mothers removed little more than *khil,* others removed several units or squeezes ('*sirka*'). Conversely, there was little ambiguity that the category of 'not discarding' did literally mean 'not discarding', regardless of whether a mother removed *khil* or washed her breast prior to feeding.

Corroborating data contributed by mother participants in the qualitative study, VDCIs reported that some women removed several units of colostrum, and this practice was classified as 'discarding':

"When even after throwing the khil, two or three sirka, four or five sirka is thrown of bigouti, then it comes in thrown and fed situation."

– VDCI key informant 3

"In cases where they throw, I used to ask how much did you throw? They used to throw three or four times… In that situation I marked as 'thrown'."

– VDCI key informant 1

Indicating an extent of heterogeneity in the behaviours falling under the category of 'discarded', there was evidence to suggest that VDCIs might also have classified a mother as having discarded if she only removed an apparently small amount of first milk:

Interviewer: "And suppose if the mother squeezes and throws only once?"

VDCI: "If it's only once, in that kind of situation it becomes… the yellow milk comes then it is called thrown."

Interviewer: "Even if it's thrown only once?"

VDCI: "Yes."

– VDCI key informant 3

"When they used to squeeze and throw the khil, they used to squeeze again to check whether the khil had gone or not. And when milk used to go, while squeezing again, we had to understand that it was thrown.

– VDCI key informant 4

However, VDCIs appeared to be near-unanimous in discounting whether a mother had removed only *khil* when classifying that she had not discarded her first milk in the MIRA questionnaire:

> *"If only a little bit of khil is thrown, in small quantity, and then the milk is fed, then only it comes in situation of that mother feeding without throwing the milk."*
>
> *– VDCI key informant 3*

> *"Now, when only khil is squeezed and thrown, we considered it not thrown… If they say that 'I just dug out the khil with needle, and I didn't milk the milk,' then I used to consider it not thrown."*
>
> *– VDCI key informant 4*

One VDCI may have gone as far as to say that even if a mother initially responded that she had discarded, he would probe to understand what exactly she had physically done, marking a mother as having 'not discarded' if she subsequently revealed that she had only removed *khil*:

> *"In the section of 'didn't throw', I used to ask them, 'did you squeeze and throw the milk'. They used to say 'yes I threw'. But at the time when I used to ask, how much they threw, what the mothers used to say was that they cleaned and about thing called thede [local word for khil] a little bit of it was squeezed. And not much of the milk was wasted. They used to say that. That during cleaning they didn't throw. And so, they wouldn't throw milk at that time. They used to clean and then only squeezed the thede little bit, but with the milk, they wouldn't big amount of the milk…. They used to only clean… They said it's like small small pimples. Yes, they used to squeeze only that and clean it. In like this time when they throw only this, I marked it as 'didn't throw'."*
>
> *– VDCI key informant 1*

It is probable that not all VDCIs probed mothers to this extent to clarify their responses. Potentially, some were less discerning in recording whether a mother had discarded or not, accepting her immediate responses without clarification. The extent of this, or its implications, may only be guessed at.

With regards to *khil,* one VDCI did report difficulty in classifying whether a mother had discarded a modest amount of her first milk, or only *khil*:

> *"Did she only throw the khil? Or while throwing khil, did milk come out as well? [Referring to questions he would ask himself when experiencing difficulty in classification]."*
>
> *– VDCI key informant 4*

And it is here that the boundary lies between whether a mother was categorised as having discarded or not; removal of only *khil* was classified as 'not discarding', while removal of any further first milk caused a mother to be classified as 'discarding'.

In classifying whether a mother had discarded or not, one VDCI also explicitly mentioned that he discounted whether she had reported washing her breast or not:

> *"Like some of them squeeze and throw and then wash. We used to consider that also thrown. But some used to squeeze and throw and feed the baby without washing. That also we used to consider as thrown."*
>
> *– VDCI key informant 2*

With the exception of the example cited above for VDCI 4, VDCIs reported little difficulty in categorising mothers, even if was sometimes necessary to probe on details of what mothers had done. Several suggestive examples can be cited:

> *Interviewer: "In any kind of situation, had you found it difficult? Like to classify it as threw or didn't throw, had you found it difficult?"*
>
> *VDCI: "I didn't have any difficulty classifying it."*
>
> *– VDCI key informant 3*

> *"It wasn't that difficult for me to classify. Mothers used to say that they threw even if they threw or didn't throw then used to say that they threw. And after I started explaining, it wasn't actually that difficult. I found it easy."*
>
> *– VDCI key informant 1*

While the amount of colostrum discarded may be a variable that arguably follows a continuous distribution as opposed to categorical absolutes, a broad categorisation of behaviours with colostrum into 'discarding' or 'not discarding' was reported to be valid according to VDCIs, and agreed with a broad dichotomy in behaviours reported by mothers. No obvious alternative or expanded categories emerged from the data.

7.4 ISSUES ENCOUNTERED DURING THE QUALITATIVE STUDY AND IN ITS INTERPRETATION

There were several issues encountered throughout the study that may have influenced data reliability. While the extent of their impact is uncertain, discussion of these potential sources is warranted. As for all qualitative data, the results presented must be interpreted in the light of the reflexive position of the researcher, and his prior assumptions which directed design and analysis.

(i) One of the main issues encountered throughout the study was one of participant shyness; in particular, mothers often reported that they felt unable to give an answer because they were not well educated. **(ii)** It is suspected that some responses suffered from desirability bias: the urge of participants to provide responses perceived to please the researcher or otherwise be the 'right' answer. **(iii)** There were several instances of inconsistency in participant responses; either their responses completely disagreed with what was recorded for them in prior MIRA surveillance (suggesting error in the quantitative data, or desirability bias), or participants alternated between claiming that colostrum is positive or negative, providing contradictory statements within a single discussion (potentially suggesting desirability bias, poor translation, or mothers misunderstanding questions). **(iv)** In rare cases, a further issue was presented when a mother reported what appeared to be problems in her onset of lactation, with no milk coming for several days postpartum. These mothers were still classified as having discarded their first milk or not. The meaning of such data in these instances is unclear. **(v)** As has been indicated in Section 7.2, some themes occurred infrequently enough for it to be unclear whether they represent unique discrepant cases or a less commonly occurring general theme. It is possible that sampling to the point of saturation was not achieved. **(vi)** Participants did not always speak Nepali as a first language, and this introduced an extra layer of interpretation and translation in order to understand mothers' responses, as well as raising the possibility that participants did not always understand the questions they were asked. **(vii)** While not invalidating data collected through other questions in the topic guides, some items were less fruitful and more often than not garnered confusion from participants. **(viii)** Further rare or

minor issues arguably included mothers not understanding the purpose of our qualitative data collection visit, and onlookers affecting the quality of data collection.

Where possible, the above items are each expanded upon below with examples.

Participant shyness. There were several instances in which mothers hesitated to provide answers because they had not received much education and were unconfident in the value of their responses. In such instances, the interviewer sometimes had to probe and reassure repeatedly, sometimes asking closed questions or altering her wording, or even simply moving on to a different topic, in order for the mother to say anything. Several instances have been observed throughout this chapter of the interviewer resorting to closed questions to encourage an answer. One brief further example is selected to illustrate participant shyness due to a perceived lack of valuable knowledge to share:

> *"I don't know. I haven't studied… I haven't studied nanu [Nepali word for young girl], I don't know anything."*
>
> *– Participant 5 (Hatiya VDC)*

There was also a related suspicion that focus group participants sometimes had a tendency to automatically agree with what the previous participant had just said, with several examples of all participants agreeing one by one that colostrum is good and shouldn't be discarded after a more vocal or confident leading mother had asserted this to begin with. However, these groups did tend to comprise mothers who had either mostly discarded or mostly not discarded according to MIRA surveillance, so the responses may have been valid.

Desirability bias. This is again arguably related to mother shyness, lack of confidence, or the feeling of needing to have studied to be able to contribute valid answers. While hard to pinpoint, there were some instances in which the extent of implausibility or inconsistency of a participant's response suggested that they had the aim of giving a 'right answer'.

One concise (and debateable) example is provided:

> *"I tell everyone not to throw the [bigouti] milk."*
>
> *– Participant 3 (Markhu VDC)*

While possible, it appears implausible in this instance that a mother would make it a significant priority to widely communicate messages about colostrum to her peers.

There were also some instances of mothers explicitly saying to the Research Assistant before or after the formal recorded interview that they didn't know what the right answers were because they hadn't studied, asking her what she would like them to say. The Research Assistant also occasionally needed to reassure participants that there was no right or wrong answer.

Inconsistency in responses. While interpretation of such dialogue is unclear, there were several instances of mothers providing contradictory statements within one interview, or even within one stanza. One mother provided a particularly puzzling example:

> *"And now I also said [to the VDCI] it was spoilt and I also threw it. Otherwise it wasn't supposed to be thrown at the beginning. I said to [the VDCI]… That mustn't be thrown. The milk must be fed. It gives you strength. That first milk. They used to say… I feel like throwing. I feel like throwing and then squeezing again and then only I like to feed next. After washing don't squeeze and throw, feed that didi haru [other women] said that and I fed that… [Bigouti] is vitamin for the baby I feel like that."*
>
> *– Participant 5 (Hatiya VDC): Recorded as having not discarded colostrum in MIRA surveillance*

More generally, there were several mothers who argued in favour of the benefits and importance of colostrum, but who were recorded as having discarded colostrum in recent MIRA surveillance. Conversely, some mothers' dialogue suggested they discarded colostrum, but were previously recorded as having not discarded, as the above example illustrated.

One further example of this phenomenon is provided below. Note that the response is offered by a mother who was recorded as having discarded her first milk in earlier MIRA surveillance:

> *"If the bigouti milk is fed without throwing, the babies will be able to fight the diseases. I thought of being able to fight the diseases, so I fed… I didn't throw… After the baby was born, I washed the breast, and I fed that right at the beginning."*
>
> *– Participant 11 (Namtar VDC): Recorded as having discarded colostrum in MIRA surveillance*

However, this example may also represent an instance of desirability bias, error in quantitative surveillance data recording, and/or a change in practices between different infants, since the mother later said in the same interview:

> *"To the children bigger than this, I washed the breast, the first thick milk, I milked and threw it. And when thinner milk used to come, I used to feed."*
>
> *– Participant 11 (Namtar VDC): Recorded as having discarded colostrum for her most recent infant in MIRA surveillance*

A related issue was the fact that the researcher analysed each transcript in full knowledge of whether the participant had been recorded as having discarded first milk or not. This lack of blinding to exposure category may have influenced the likelihood of interpreting behaviours that could be considered to typify discarding or not in each interview, leading to a biased analysis.

To examine the extent of this issue and the inconsistency of some interviews, two of the researcher's supervisors (D Osrin and N Saville) read through each mother SSI transcript, blind to exposure category, and then guessed whether she had been recorded as having discarded colostrum or not in earlier MIRA surveillance.

The result of this exercise was that all mothers who did not discard colostrum were correctly identified (with one exception: Participant 5 by one reader), but nearly half of the mothers who discarded colostrum according to earlier surveillance were not correctly classified by blinded readers (four out of nine participants for both readers). The results suggest that inconsistencies were particularly marked, or behaviours otherwise less clear, amongst mothers who discarded than those who did not. This finding potentially adds weight to the argument that there was desirability bias, or a change in behaviour or perception since the time of the quantitative surveillance visit.

Problems in initiation of breastfeeding. One mother in particular (Participant 13) reported that lactation only began for her in earnest at a week postpartum. Participant 13 was also recorded as having discarded first milk, and in qualitative interview reported feeding her infant through a wet nurse for the first week. In this context, it is unclear how she was recorded as having discarded colostrum, although she would have been unable to feed her own colostrum.

Participants not speaking Nepali as a first language. This was particularly an issue in FGDs in the Tamang and Praja communities, since the temptation was for mothers to talk amongst themselves in their indigenous language and become distracted from the main discussion, or provide information that was incomprehensible to the research assistant.

For example, an excerpt from the transcript of the Praja FGD in Bharta read as follows:

{Mother 1 talking in Chepang language}

Interviewer: "Yes, tell me what you're saying. We cannot understand your language, so now can you tell us?"

{Mothers making conversation in Chepang language}

Interviewer: "You tell me in your language and then she'll tell me."

{Mothers making conversation in Chepang language}

Interviewer: "Didi [elder sister/woman] listen to me, didi listen to me, didi didi tell us why did you do that? ... If you're having difficulty speaking in Nepali, you can tell her in your language and she'll tell me."

{Mothers making conversation in Chepang language}

– Focus Group Discussion, Bharta VDC

The result is that fewer data were available from these discussions, and there is a risk that mothers were less able to understand the questions they were asked.

Questions less frequently understood by mothers. In particular, there was one item appearing early in interviews that, in retrospect, confused many participants and generated relatively little data of use. The interviewer asked in all mother SSIs and FGDs words to the effect of:

"Last year, when the VDCI asked you those questions, there was this one question, 'before breastfeeding your baby for the first time, did you squeeze and throw the bigouti milk?' According to you, what did you think the question was trying to ask? How did you understand this question?"

In many instances mothers gave responses as if the question was prescriptive:

"It means it mustn't be thrown. It's trying to say that bigouti milk mustn't be squeezed and thrown."

– Focus Group Discussion, Bharta VDC

Interviewer: "So what do you think the question was trying to say?"

Mother: "The first bigouti must be fed to the baby. It is good for the baby."

– Focus Group Discussion, Bharta VDC, Ward 1

There were also rare instances in which mothers initially thought the research assistant was talking about animal milk colostrum as opposed to her own, before clarification.

Perceptions towards first milk could broadly be divided into a dichotomy of positive and negative sentiments, and these corresponded with whether mothers reported discarding some of their first milk or not, reinforcing the idea that there was an aligned dichotomy in both perceptions and behaviours. Positive themes included the capacity of colostrum to confer protection against diseases, vitamins and nutrition, strength, and general benefit. Negative themes included the perception that first milk caused evil spirits to enter the infant, or that it was pathogenic, dirt, or generally harmful. Sources of information influencing these perceptions included the MIRA women's groups, medical staff, neighbours and mothers-in-law. Khil was regarded negatively almost universally, and was physically as well as conceptually distinct from colostrum, widely described as a blockage preventing the onset of lactation.

Mothers who did not discard colostrum were classified in such a way because none of their first milk was discarded, with the exception of khil or washing the breast. Mothers who did discard colostrum were included in this group if they removed a range of volumes, from very little to several units (squirts). VDCIs reported little difficulty in classifying mothers' responses as discarding or not during the MIRA surveillance.

Colostrum discarding showed no clear conceptual association with delayed initiation, and an infant could apparently still receive some colostrum (milk in the first two to three days postpartum) even if some of it was discarded soon after birth. The closed binary wording of the surveillance question on colostrum discarding appeared valid, with no further categories suggested. Data and conclusions may have been influenced by participant shyness, desirability bias, interviewer inexperience and a small study size. It remains unclear why significant effects of colostrum discarding on neonatal mortality were observed in Chapters 5 and 6.

CHAPTER 8: DISCUSSION AND RECOMMENDATIONS

8.1 STATEMENT OF PRINCIPAL FINDINGS

There were significant associations between several dimensions of early infant feeding practices and neonatal mortality. In Makwanpur, discarding of first milk more than doubled the odds of neonatal mortality in singletons born at term who initiated breastfeeding and survived 48 hours (aOR 2.21 [95% CI 1.47 - 3.32]), after adjustment for a range of potentially confounding variables including other dimensions of early infant feeding. Calculation of population attributable risk suggested that 8% of all neonatal deaths in Makwanpur could be avoided if no mothers discarded colostrum. In Dhanusha, discarding of first milk had a significant association with neonatal mortality (aOR 1.28 [1.00 - 1.62]), the extent of which increased after the exclusion from analysis of infants dying within the early neonatal period (aOR 1.96 [1.41 - 2.72]). The results suggested that 5% of all neonatal deaths in the district could be avoided if no mothers discarded colostrum. Discarding of first milk more than doubled the odds of infection-specific neonatal mortality in Makwanpur (aOR 2.58 [1.50 – 4.43]), and a significant association was observed in Dhanusha (aOR 1.68 [1.21 – 2.34]). While discarding of first milk significantly increased the odds of developing suspected ARI in Makwanpur (aOR 1.22 [1.08 - 1.39]), this was not observed in Dhanusha.

Delayed breastfeeding initiation time was associated with an increased risk of neonatal mortality in both sites. In Makwanpur, this effect was observable after aggregating initiation times into early (≤24h) and late (>24h) categories (aOR 2.28 [1.07 – 4.88]), since there were few mothers who initiated after 24 hours. In Dhanusha a significant effect was visible for disaggregated categories, with those initiating after three days experiencing a threefold increase in the odds of neonatal mortality compared to those initiating within one hour (aOR 2.97 [1.84 – 4.78]).

Non-exclusive breastfeeding was strongly associated with an increased risk of neonatal mortality in both sites (Makwanpur: aOR 4.47 [1.56 – 12.76]; Dhanusha: aOR 3.55 [2.09 – 6.03]), after adjustment for dimensions of early infant feeding. There was no significant association between prelacteal feeding and neonatal mortality risk, and the thesis presented the first analysis of prelacteal feeding and neonatal mortality in a south Asian context. In risk factor analyses, ethnicity, literacy, antenatal care visits, birth attendance, and a mother's previous experience of a neonatal death were significantly associated with risk of colostrum discarding in both locations.

Qualitative data from Makwanpur indicated that there was a dichotomy in practices and perceptions of first milk, with mothers either discarding some amount of colostrum or not. Positive themes included the capacity of colostrum to confer protection against diseases, vitamins and nutrition, strength, and general benefit to the infant. Negative themes included the perception that first milk caused evil spirits to enter the infant, or that it was pathogenic, dirt, or generally harmful. Sources of information influencing these perceptions included the MIRA women's groups, medical staff, neighbours and mothers-in-law.

This is the first robust study to specifically examine the impact of discarding colostrum on neonatal mortality and morbidity outcomes and the results appear to be consistent with biological and epidemiological evidence. The findings also corroborate previous studies on the impact of delayed initiation of breastfeeding on neonatal mortality[138,160], and the benefit of exclusive breastfeeding on neonatal outcomes[133,137,138], after inclusion of colostrum discarding as a term in adjusted models. The results complement mixed findings on the impact of prelacteal feeds[137,159].

8.2 DISCUSSION OF QUANTITATIVE FINDINGS

Section 2.3 presented a framework for the assessment of evidence that might imply a causal relationship, as opposed to a relationship due to chance, bias or confounding. Six considerations were particularly relevant to the study of early infant feeding practices and neonatal outcomes: (i) the strength of an association, (ii) consistency, (iii) specificity, (iv) temporality, (v) dose response gradient, and (vi) biological plausibility. While none of the indicators in themselves imply causation, their cumulative presence allows for critical judgement of potential causal associations. Section 1.6 presented a biological framework of plausible causal pathways.

In this section, the quantitative results of the thesis are assessed in light of these criteria, and with consideration of whether they might be attributable to chance, bias or confounding. Many of the secondary analyses were conducted to support the primary analysis relating colostrum discarding and neonatal mortality; accordingly they are considered within an overall logical framework, and not independently.

8.2.1 Colostrum discarding and neonatal mortality, infection-specific neonatal mortality and suspected ARI

The adjusted odds ratio for neonatal mortality amongst colostrum discarders compared to non-discarders was 2.21 (1.47 - 3.32) in Makwanpur after the addition in models of numerous potential confounders, including prelacteal feeding and breastfeeding initiation time. The equivalent odds ratio for Dhanusha was 1.28 (1.00 - 1.62). After exclusion of all early infant deaths from analysis, the apparent effect remained the same in Makwanpur (aOR 2.19 [1.35 - 3.57]), and increased in Dhanusha (aOR 1.96 [1.41 - 2.72]). Addition of colostrum feeding as a model term tended to improve fit, particularly in Makwanpur.

Strength of association. While not exhibiting very large odds ratios, the effect of colostrum discarding was clinically and statistically significant after adjustment for a wide range of other terms.

Consistency. The effect was similar across both sites, suggesting consistency. However, data collection systems were similar in both locations, and although geographically and culturally divergent, they both represent populations in the central region of Nepal. A more robust statement of external validity could be made if the same effect was observed elsewhere and under different study conditions. However, other results, in respect of breastfeeding initiation time and exclusive breastfeeding, were consistent with the findings of studies by other groups, lending support to the validity of overall findings produced by MIRA.

Specificity. It is notable that in both study sites the odds of infection-specific neonatal mortality amongst colostrum discarders were greater than the odds of all-cause neonatal mortality, suggesting that colostrum discarding had a stronger effect on infection-specific neonatal mortality. Adjusted odds ratios for infection-specific mortality were 2.58 (95% CI: 1.50 – 4.43) in Makwanpur and 1.68 (95% CI: 1.21 – 2.34) in Dhanusha (compared to 2.21 and 1.28 respectively for all-cause mortality). Given that the biological action of colostrum might plausibility be expected to particularly affect risk of death from infection, and to affect mortality attributable to

other causes such as asphyxia to a lesser or no extent, this finding of specificity supports the potential causal framework posited in Section 1.6.

Temporality. A simulation of temporality was introduced into analysis by excluding infants who died within the first two days postpartum and repeating analysis with the exclusion of all early neonatal deaths, in addition to further exclusion criteria as outlined in section 3.8. For the majority of included cases, it is likely that early infant feeding sufficiently preceded onset of events leading to death for temporality in the results to be a valid assumption. The profile of causes of death before and after application of the exclusion criteria, shown in Tables 5.2 and 6.2, suggested that to a major extent the criteria were effective in limiting analysis to deaths that may have been influenced by early infant feeding practices. Odds ratios for neonatal mortality were the same in Makwanpur after exclusion of deaths in the first two days or all early neonatal deaths, and odds ratios increased in Dhanusha after exclusion of all early neonatal deaths, suggesting that the significant results were not due to potentially fatal problems preceding and influencing the probability of different early infant feeding practices. Similar exclusion criteria to limit reverse causality have also been employed in comparable analyses elsewhere[138,160,287]. While reverse causality cannot be completely ruled out as having had an effect on results, it is likely to have been greatly reduced.

Biological plausibility. In addition to infection-specific neonatal mortality being more affected by colostrum discarding than all-cause neonatal mortality, a relationship with suspected acute respiratory infection was also observed in Makwanpur (aOR 1.22 [1.07 - 1.39]). Referring to the biological framework of plausible potential causal pathways linking colostrum discarding and neonatal mortality in Figure 1.9, the impact of colostrum discarding on risk of infection was one of the major intermediate steps necessary for biological plausibility in a causal relationship. It is notable, however, that a significant association with suspected ARI was not observed in Dhanusha. This may have been because of error in classifying suspected ARI cases: rates were much higher in Dhanusha than Makwanpur (14% of births compared to 9%), suggesting a possible lack of specificity in this composite indicator. However, due to generally poorer hygiene and nutritional practices in Dhanusha, more poverty, and a high prevalence of pneumonia in the winter foggy

season, the difference in suspected ARI rates between Makwanpur and Dhanusha could feasibly have been real.

Several complementary arguments for biological plausibility of an impact of colostrum discarding on neonatal mortality were outlined in Section 1.6. These included the potential involvement of colostrum feeding in:

- mother-to-infant immune transfer,
- probiotic gut colonisation with inhibition of colonisation by pathogenic bacteria, which in turn affects immune development and gut permeability,
- intake of growth factors, lactoferrin and other agents involved in intestinal cell proliferation,
- establishment of early suckling behaviour, influencing later breastfeeding,
- intake of fluids, electrolytes and energy immediately postpartum, influencing metabolic function and risk of dehydration and electrolyte imbalance, and hypoglycaemia,
- maternal contact, potentially linked with hypothermia risk.

Based on the considerations above, a causal relationship between colostrum discarding and neonatal mortality appears plausible, even if some of the hypothesised mechanisms may be more applicable than others. However, it is also necessary to discuss the extent to which the results may be attributable to explanations other than causation.

Chance. For well-designed randomised controlled trials the p-value can be directly interpreted as the probability of observing a result by chance under the assumption that the null hypothesis is true; the only possible explanations for an observed outcome in such situations are causation and chance, since bias and confounding are theoretically eliminated. The interpretation of p-values is less defined in the case of observational studies, although 0.05 is still a threshold with which to assess whether there is a significant effect.

With a p-value of less than 0.0001 for all primary analyses in Makwanpur, it appears unlikely that results here arose by chance. Although the results were only marginally significant for Dhanusha when early neonatal deaths (after day two) were included in analysis (Table 6.7, model 4; p=0.043), p-values of less than 0.0001 were again observed when analysis was repeated with the exclusion of early neonatal deaths. With the studies benefitting from large sample sizes, chance alone can reasonably be discounted as an explanation for observed associations between colostrum discarding and neonatal mortality.

Residual confounding. Confounding was limited in analyses through a number of measures that included adjustment for a wide range of covariates, and exclusion of certain types of infant such as preterm and multiparous births. However, residual confounding can never be fully discounted because available information may not accurately represent all suspected sources of confounding, and there may be further sources unimagined by the researcher.

Analyses were adjusted for exposure to the women's group interventions (and FCHV training for management of neonatal infection in Dhanusha), household religion (strongly related to ethnicity in Makwanpur), caste grouping in Dhanusha, season of birth, maternal literacy, maternal age, primiparity, previous neonatal death, number of antenatal care visits, home birth, skilled birth attendance, infant sex, date of birth, exclusive breastfeeding, and a socioeconomic status proxy generated via the use of principal components analysis of asset ownership data, in addition to the progressive addition of other dimensions of early infant feeding. Variables were selected *a priori* even if they were not found to confound associations.

While some of these variables are likely to have been captured with a high degree of accuracy – for example mothers can be expected to know whether their infant is male or female – other measures such as the principal components analysis score of asset ownership data are by definition a proxy for underlying properties such as household wealth. The majority of covariates adjusted for in the analyses were arguably of a more definite nature, like infant sex or birth location, with recorded measurements likely to reflect the underlying reality of the situation. Some variables, such as maternal literacy, may be more subject to VDC Interviewer interpretation at

the point of data collection, although this variable showed a strong correlation with level of education, and a relationship with wealth, suggesting validity.

Low birth weight infants were identified and excluded from analysis through perceived size as reported by mothers, and no scale measurement of birth weight was available. While previous studies have shown maternal perception of birth size to be a reasonable proxy for measured birth weight[160], no equivalent validation was possible either for Makwanpur or Dhanusha and maternal perception may or may not have provided a close proxy of birth weight. It is notable, however, that in Makwanpur after application of exclusion criteria, there were no deaths classified as having been caused by low birth weight, and only one death attributable to prematurity (Table 5.2). For Dhanusha, the majority of deaths attributable to prematurity and half of those attributable to low birth weight were excluded (Table 6.2). While low birth weight may have remained as a potential confounder, any effect would at least have been mitigated in analyses.

Other potential confounders can be imagined. One of these is the practice of 'eating down', whereby less food is consumed by a mother during pregnancy in order to have a less difficult birth or under the ethnophysiological argument that eating less leaves more room for the developing fetus[331]. Conceivably, mothers who 'eat down' might also be more likely to discard colostrum and to suffer a neonatal death. However, recent research in Nepal's central *Terai* has suggested that eating down is less common (practised by less than 20% of mothers) than previously suspected[332]. It is unlikely that such confounding alone could account for the strength and consistency of associations between colostrum discarding and neonatal mortality seen in the results.

Some residual confounding may have remained from unimagined or immeasurable sources, such as personality differences between mothers, always leaving open the possibility of over-estimation of the effect of colostrum discarding and other early infant feeding practices. However, all reasonable lengths to reduce the potential impact of residual confounders were employed, and the surveillance systems of Makwanpur and Dhanusha made available a wide range of variables to adjust for in models.

Bias. The scope for information bias, whereby random or systematic error is introduced in measurement of an exposure or measurement of an outcome, is reasonable both for Makwanpur and Dhanusha. This is particularly due to the periods of recall that could occur between birth and data collection with mothers.

Little information bias is expected in an outcome as clearly defined as neonatal mortality, and any misclassification between early neonatal deaths in the first days postpartum and stillbirths would become irrelevant in analysis after application of the exclusion criteria. However, with a proportion of interviews occurring several months postpartum, the potential is raised for misclassification of a small number of infant deaths that occurred shortly after the neonatal period, as neonatal deaths. This may lead to a slight overestimation of overall neonatal mortality rates, but does not explain why such a marked difference in mortality risk between colostrum discarders and non-discarders was observed. While some error may also have been introduced in the classification of causes of neonatal death from verbal autopsy data, it is hard to envisage how colostrum discarders might systematically be more likely be mistakenly classified as having died from infectious causes, when the clinicians responsible for classification were unconcerned by colostrum discarding exposure.

Information bias is more conceivable in the measurement of the colostrum discarding exposure category itself and the measurement of morbidity data contributing towards composition of the suspected ARI outcome variable. As was suggested in the qualitative analysis of Chapter 7, mothers were classified as having discarded colostrum or not even if they experienced problems in the onset of lactation for up to a week, and some mothers apparently held colostrum in high regard despite classification in earlier surveillance of discarding, suggesting a potential for information bias (although this may have been due to desirability bias or translation error in qualitative interviews). Asked about indicators such as whether the infant had fast breathing for more than six hours, it is conceivable that maternal recall of events several months postpartum may not have always accurately reflected morbidity events that took place during the neonatal period.

However, information bias could only explain an observed apparent association between colostrum discarding and neonatal mortality or suspected ARI if errors were systematic. Random error diminishes the probability of observing significant results, and may go some way to explaining why a significant association between colostrum discarding and suspected ARI was not observed in Dhanusha. No reason can be envisaged for why mothers of infants who died would be more likely to be mistakenly classified as having discarded colostrum; for example the item was one question of many and of no particular concern to VDC Interviewers, so an interviewer's knowledge of whether a neonatal death occurred would not be expected to influence the results. While feasible, there is also no strong reason to suspect that mothers who discarded colostrum were also systematically more likely to falsely recall morbidity indicators of suspected ARI in Makwanpur.

A related form of recall bias can be envisaged, that may conceivably have been systematic, but which reduced the probability of observing significant associations between colostrum discarding and neonatal mortality. In the exclusion criteria outlined in Section 3.8, infants were excluded from analysis if they were recorded as having been noted by mothers as very big, very small, born at an early gestational age, or looking abnormal at the time of birth. The mother of an infant who died might be more likely to falsely recall such a problem as "looking abnormal", since an event as major as death may lead a mother to be more likely to retrospectively believe that there might have been something wrong with the newborn infant. This would lead infants who died to be more likely to fall under the exclusion criteria, in turn resulting in a lower sample size and fewer deaths, in turn reducing the probability of observing significant results. There is no reason to suspect that colostrum discarders or non-discarders would systematically be more likely to be excluded from analysis through such a mechanism.

Selection bias occurs if some members of a population are more likely to participate in the study than others. Refusal to participate was not an issue within the study population. It is conceivable that some mothers in particularly remote areas were more likely to be omitted from surveillance. However, all households were mapped at baseline in Makwanpur and in Dhanusha and lists of married women were maintained and updated throughout, so this was unlikely to be an issue here. Also, Dhanusha benefits from more developed communications, a flat accessible

landscape, and enumerators were incentivised per event identified, not paid on a flat salary. Selection bias is an unlikely explanation for the observed results.

Few sources of bias have been identified in the quantitative data. Of those identified, they are suspected to have either introduced random error, which reduces the probability of observing significant results, or to have introduced systematic error in a way that would cause more infants to fall under the exclusion criteria, reducing the probability of observing significant results.

The influence of clustering in data. The data from both Makwanpur and Dhanusha had a multi-level structure. If data on individuals are analysed using standard methods that assume independence of observations, standard errors and confidence intervals are underestimated, and the statistical significance of any observed effects is exaggerated, leading to an inflated probability of Type I (false positive) error[294]. Random effects logistic regression models were used in analyses, taking account of between-cluster variation, and their use was supported by quadrature checks. It is unlikely that significant results were observed because of the clustered data structure.

Is there a causal association between colostrum discarding behaviour and neonatal mortality, infection-specific mortality and suspected ARI? It remains to delineate the spectrum of behaviour that 'colostrum discarding' may cover, but the evidence accumulated in the thesis strongly suggests that this exposure has a genuine, large and consistent causal effect on risk of neonatal mortality, after adjustment for other dimensions of early infant feeding, and represents an important new dimension in the study of early infant feeding. It is likely that infection is a major pathway through which all-cause neonatal mortality is influenced by colostrum discarding, supporting hypothesised biological mechanisms underlying the expectation of a harmful effect of discarding colostrum.

8.2.2 Breastfeeding initiation time and neonatal mortality

The same logic can also be applied in deducing whether associations between breastfeeding initiation time and neonatal mortality were causal. The adjusted odds ratio for neonatal mortality amongst infants initiating breastfeeding after 24 hours compared to before 24 hours was 2.28 (1.07 – 4.88) in Makwanpur after the addition of potential confounders including prelacteal feeding and colostrum discarding as model terms. In Dhanusha, the odds ratio for neonatal mortality amongst infants initiating after day three was 2.97 (1.84 – 4.78) after adjustment for potential confounders including prelacteal feeding and colostrum discarding. Addition of breastfeeding initiation time as a term in models tended to significantly improve fit.

Assessment of causality. Suggestion of a genuine causal relationship can again be assessed with the criteria of strength of association, consistency, specificity, temporality, dose response, and biological plausibility. On the criteria of **strength of association**, odds ratios were significant but not as strong as those observed by other researchers who had previously investigated the impact of breastfeeding initiation time on neonatal mortality[138,160].

On the criteria of **consistency**, not only can results be compared between Makwanpur and Dhanusha (where the results are broadly consistent with each other) but comparison can also be made with previous papers examining the effect of breastfeeding initiation time on neonatal mortality. Table 8.1 compares the results observed in Makwanpur and Dhanusha with results observed by Edmond and colleagues in rural Ghana[160], and by Mullany and colleagues in Sarlahi District, Nepal[138]. Similar exclusion criteria were employed in all four studies, odds ratios were adjusted for a wide number of potentially confounding variables, and identical breastfeeding initiation time categories were compared. Odds ratios and trends of their increase with delayed initiation time were comparable across all studies, although in Makwanpur a significantly increased risk of mortality amongst late initiators was only visible after aggregating initiation time categories. Despite these differences, the overall similarity in findings across four locations lends a suggestion of external validity and consistency to the results observed for breastfeeding

initiation time in the thesis. There is a growing and consistent body of evidence supporting the claim that delayed breastfeeding initiation time increases risk of neonatal mortality.

On **temporality**, the same exclusion criteria were employed as for the analyses of the effect of colostrum discarding, introducing a simulation of temporality. Unlike the binary exposure categories encountered throughout the thesis, for progressively delayed initiation times it is possible to comment upon potential evidence of a **dose response** effect in exposure categories. As for Ghana and Sarlahi, a test for trend was significant in Dhanusha, and odds ratios visibly increased with delayed initiation time. While the trend was not significant in Makwanpur, crude observation of the odds ratios in each initiation timing category is suggestive of a progressively increasing neonatal mortality risk as initiation time is further delayed. Conclusions on dose response cannot, however, be drawn from Makwanpur alone because so few infants initiated after 24 hours.

Assessment of **biological plausibility** overlaps with many of the same explanations outlined for why discarding colostrum may be expected to increase risk of neonatal mortality. Since colostrum can be considered as breastmilk in the first two or three days postpartum, discarding some of it, or withholding it for a length of time before initial feeding, may be expected to affect neonatal mortality through similar or identical mechanisms.

Overall, a causal relationship between breastfeeding initiation time and neonatal mortality appears plausible based on the above criteria.

Chance. Results were significant across both sites (in Makwanpur, after aggregation of initiation times). In Dhanusha, the p-value was less than 0.0001 when comparing odds of neonatal mortality in infants initiating after day 3 against the reference category of infants initiating within the first hour. Chance is an unlikely explanation for the observed results in breastfeeding initiation time.

Table 8.1: Odds of neonatal mortality by breastfeeding initiation time category in singletons born at term who initiated breastfeeding and survived 48 hours – comparison of Makwanpur, Dhanusha, rural Ghana and Sarlahi district, Nepal

Initiation of breast-feeding	Makwanpur aOR [a] (95% CI; p)	Dhanusha aOR [b] (95% CI; p)	Ghana[160] aOR [c] (95% CI; p)	Sarlahi, Nepal[138] aOR [d] (95% CI; p)
Within 1h	1	1	1	1
From 1h to end day 1	0.80 (0.52 – 1.22)	1.28 (0.79 – 2.07)	1.43 (0.88 – 2.31)	1.95 (0.72 – 5.27)
Day 2	1.83 (0.56 – 6.00)	0.75 (0.47 – 1.19)	2.52 (1.58 – 4.02)	2.80 (1.03 – 7.60)
Day 3	2.28 [e] (0.87 – 5.97)	1.60 (0.96 – 2.66)	2.84 (1.59 – 5.06)	4.08 (1.49 – 11.15)
After day 3	2.28 [e] (0.87 – 5.97)	2.97 (1.84 – 4.78)	3.64 (1.43 – 9.30)	4.19 (1.39 – 12.67)
P trend	0.317	<0.0001	<0.0001	<0.0001
Sample size	15 919	14 991	10 947	22 838

[a] Odds ratio adjusted for exposure to the women's group intervention, household religion, season of birth, maternal literacy, maternal age, primiparity, previous neonatal death, number of antenatal care visits, home birth, skilled birth attendance, infant sex, date of birth, exclusive breastfeeding, socioeconomic status, colostrum discarding and prelacteal feeding.

[b] Adjusted for exposure to the women's group intervention, exposure to the FCHV training intervention, household religion, Pahadi/Madeshi caste grouping, season of birth, maternal literacy, maternal age, primiparity, previous neonatal death, number of antenatal care visits, home birth, skilled birth attendance, infant sex, date of birth, exclusive breastfeeding, socioeconomic status, colostrum discarding and prelacteal feeding.

[c] Adjusted for gender, birth size, gestational age, presence of a congenital anomaly, health on the day of birth, health at the time of interview, mother's health at the time of delivery, age of mother, parity, educational level of mother, mother having cash income, household water supply, place of defecation, number of antenatal visits, place of birth, birth attendant and established breastfeeding pattern.

[d] Adjusted for variables including low birth weight, prematurity, cord and skin cleansing treatment allocation in the parent trial, maternal literacy, sex, maternal hand-washing previous death of a sibling, ethnicity, parity and maternal report of fever in the 7 days prior to delivery.

[e] For Makwanpur, data for day 3 and after day 3 merged to form category 'after day 2' due to few infants initiating breastfeeding after day 2.

Residual confounding. Models were adjusted for a similar range of terms as for analyses comparing colostrum discarders and non-discarders. Again, while residual confounding can never be fully discounted because available information may not accurately represent all suspected sources of confounding and there may be further sources unimagined by the researcher, it appears unlikely as an explanation for the significant results.

Bias. A similar range of potential sources of information and selection bias exist in the study of breastfeeding initiation time as were applicable to colostrum discarding. A further complication in this instance is the potential for error in recall of the time of initiation, leading to misclassification of exposure categories. There is no obvious reason to suspect that infants who died may be systematically more likely to be classified as having initiated later or earlier. However, the 'noise' introduced by this form of error if it is random may have reduced the likelihood of observing significant results, and may go some way to explaining why non-significant results were observed in intermediate breastfeeding initiation timing categories. This is particularly applicable to Dhanusha where the sample was more evenly distributed across the possible spectrum of initiation times. There may also be a general tendency for mothers across the entire sample to recall earlier or later initiation times than was truly the case. With some interviews occurring several months postpartum, it is plausible that a degree of recall bias existed in the classification of breastfeeding initiation time exposure categories existed, although the precise nature or size of this bias is difficult to determine.

Is there a causal association between breastfeeding initiation time and neonatal mortality? Particularly given the comparable results identified in Ghana and the Sarlahi district of Nepal, the dose response relationship and the biological plausibility of an effect, it appears likely that delaying breastfeeding initiation time does have a causal relationship with increased neonatal mortality. Whereas the precise behaviours constituting 'colostrum discarding' remain somewhat unclear, breastfeeding initiation time is a readily understood measure.

8.2.3 Prelacteal feeding and neonatal mortality

The adjusted odds ratio for neonatal mortality amongst infants given prelacteal feeds compared to those not given prelacteal feeds was 0.70 (0.30 - 1.64) in Makwanpur after the addition of numerous potential confounders including colostrum discarding and breastfeeding initiation time as model terms. The equivalent odds ratio for Dhanusha was 0.92 (0.72 - 1.16). In both studies, addition of prelacteal feeding as a term in models tended not to improve fit.

Data both from Makwanpur and Dhanusha did not suggest a significant effect of prelacteal feeding on neonatal mortality, despite the biological plausibility that an effect may be expected. It is notable that the predominant types of prelacteal feed were different between the two studies. Prelacteal feeds in Makwanpur were almost exclusively of the types that can be briefly 'tasted' by a newborn infant prior to breastfeeding, in that ghee, sugar or honey do not replace first breastmilk or present a major sustained source of potential pathogenic contamination. In Dhanusha, the most common prelacteal feed was goat's milk, although it is unclear from the questionnaire data whether this was fed as a substitute for early breastmilk, or as a briefly sampled feed. Overall prelacteal feeding as a binary variable was not associated with neonatal mortality in the two studies, but that does not mean that less frequently used specific varieties of prelacteal feed could not introduce significant risk. The fact that non-significant findings were observed in the different sites with different predominant prelacteal feeds does, however, lend weight to a more general assertion that prelacteal feeding does not increase the risk of neonatal mortality.

To date, there has been some evidence of a harmful effect of prelacteal feeding on neonatal mortality and morbidity outcomes[149,159], and some research suggesting no effect[137]. The investigation of prelacteal feeding is complicated by the fact that it comprises considerable potential variation in the substances fed, the quantities, and the reasons behind their provision. The qualitative analysis of Chapter 7 illustrated that some mothers fed, for example, a small amount of ghee or honey (or a 'lick' of sugar) immediately postpartum regardless of whether problems were experienced in lactation, which may be distinguished from the feeding of buffalo's milk or other

liquids as a breastmilk substitute when problems are experienced in the initiation of lactation. Solids such as porridge (locally, this means a paste of roasted grains or other flour) are a further type of rarely-given prelacteal feed which may present their own risks. Water-based prelacteal feeds may present a variable risk of pathogenic contamination in different settings. It comes as no surprise that results on the risks associated with prelacteal feeding appear inconsistent between studies, even before considering how study design may have influenced results in each instance.

8.2.4 Exclusive breastfeeding and neonatal mortality

The adjusted odds ratio for neonatal mortality amongst infants non-exclusively breastfed compared to those exclusively breastfed was 4.47 (1.56 - 12.76) in Makwanpur after adjustment for dimensions of early infant feeding including colostrum discarding. The equivalent odds ratio for Dhanusha was 3.55 (2.09 - 6.03). Exclusive or non-exclusive breastfeeding was determined through the question “at the moment, are you feeding the baby only mother's milk or are you giving some other things like water, lactogen or cow or buffalo milk as well?” in Makwanpur, while in Dhanusha mothers were asked “what did you feed the baby in the last seven days?” (Mothers were asked what they were feeding infants prior to death in instances of mortality). Analysis was restricted to mothers interviewed shortly after completion of their infant’s neonatal period, so that interpretation of the results may reasonably be related to whether infants were exclusively breastfed or not during the neonatal period.

It was shown in Section 1.3 that existing evidence suggests a benefit of exclusive and predominant breastfeeding over partial breastfeeding, in the neonatal period as well as the wider infant period, in terms of mortality as well as morbidity outcomes. In particular, several studies have already demonstrated a protective effect of exclusive or predominant breastfeeding on risk of all-cause neonatal mortality[133,138], or infection-specific mortality[137]. While a broad benefit of exclusive or predominant breastfeeding appears reasonably well-established, and only a distinction between

exclusive and non-exclusive breastfeeding was possible in the thesis, the analyses in the thesis add further weight to previous findings that have focused on the neonatal period. Odds ratios were presented after adjustment for colostrum discarding in addition to other dimensions of early infant feeding, a term that has not been available in earlier analyses.

In assessing potential causality, the association is strong, consistent and in agreement with external evidence, and the results are supported by biological plausibility. The criterion of temporality is harder to assert in this instance, since mothers were questioned on their recent breastfeeding pattern at the time of interview (in the case of surviving infants), or what they were feeding their infant prior to death (in the case of infants who did not survive), which allows only a broad indication of whether an infant was exclusively breastfed over the neonatal period. It is possible that a proportion of infants were exclusively breastfed throughout most or all of the neonatal period, but non-exclusively breastfed by the time of interview (for surviving infants only). This could arguably lead to an underestimation of the impact of non-exclusive breastfeeding, since some surviving infants who were exclusively breastfed throughout the neonatal period (lower risk) may have been recorded as having been non-exclusively breastfed. Difficulties in asserting temporality do not in themselves undermine the potential conclusion that there is a causal relationship between non-exclusive breastfeeding and neonatal mortality, but such a conclusion is also not supported according to this criterion – the possibility always remains that a problem in an infant could precede both the probability of death and a mother's choice of feeding pattern.

Chance and confounding appear to be unlikely explanations alone for why the results in Makwanpur and Dhanusha were observed; p-values were highly significant, and models were adjusted for a wide range of terms as was the case for other analyses. Concerns over information bias were limited by the restriction of analysis to only include infants of mothers interviewed shortly after the neonatal period. Some selection bias may conceivably have occurred if mothers interviewed months after the neonatal period (who were excluded) were more or less likely to have exclusively breastfed or experienced a neonatal death, but this is unlikely as the delay in interviews was mainly caused by insecurity which affected all interviews in an area at any one time. Such a mechanism is unlikely to explain the significant

results observed. In the light of existing evidence on established feeding pattern, it appears likely that non-exclusive breastfeeding poses an increased risk to neonatal mortality.

8.2.5 Summary

It is likely that colostrum discarding has a causal association with neonatal mortality, in the context of other more-established dimensions of infant feeding as terms in adjusted models. While correlated with other dimensions of early infant feeding, colostrum discarding appears to be a distinct dimension in its own right. Breastfeeding initiation time and exclusive breastfeeding continue to display what it also most likely a causal relationship with neonatal mortality after adjustment for colostrum discarding, while prelacteal feeding does not.

Colostrum discarding is potentially an important new dimension in early infant feeding, and the results from Makwanpur and Dhanusha invite external validation with further research. The quantitative results raise the question of what is precisely meant by colostrum discarding.

8.3 DISCUSSION OF QUALITATIVE FINDINGS AND SYNTHESIS – WHAT IS COLOSTRUM DISCARDING AND WHY DOES IT AFFECT RISK OF NEONATAL MORTALITY IN MAKWANPUR AND DHANUSHA?

Before understanding what behaviours 'colostrum discarding' may entail, or what precise biological mechanisms may be responsible, the quantitative investigative avenues of the thesis have suggested that there is a novel dimension of early infant feeding that can be called colostrum discarding, which appears to influence risk of neonatal mortality independently of other dimensions of early infant feeding. The qualitative investigation described in Chapters 4 and 7 was conducted in order to describe the nature of practices and reasons behind keeping or discarding first breastmilk, and to understand how different behaviours may have been categorised. Sections 1.5 and 1.6 discussed potential biological mechanisms for an association between colostrum discarding and neonatal mortality or morbidity outcomes.

Why does 'colostrum discarding' increase risk of neonatal mortality? At face value, it is surprising that significant (and clinically important) results were observed when mothers often reported only removing one or two 'squeezes' of their first milk when they practiced behaviours categorised as 'discarding'. There are several potential explanations for these findings. These include (i) the possibility that mothers understated or otherwise inaccurately reported what they did with their first breastmilk in the qualitative study, or (ii) that discarding even a seemingly small quantity of early breastmilk, independently of initiation time, may have a sizeable impact on risk of neonatal mortality. I discuss these two ideas below. (iii) A third potential explanation, that mothers who discard colostrum are also delaying initiation and/or offering prelacteal feeds in place of their first milk, does not appear valid based on the evidence presented in the thesis.

(i) Did mothers understate or otherwise misreport what they did with their first breastmilk? Although data were collected from 57 sources (including 50 mothers in focus group discussions and semistructured interviews combined), and up to a day was taken prior to interviews to share food and time with participants to build a trusting and communicative relationship, the possibility remains that few participants provided full accurate detail of what they did with their first breastmilk and why. As was suggested in Section 7.4, participant shyness was an issue, and the qualitative study was adapted to help overcome this difficulty. Desirability bias was an associated concern, where to an indeterminate extent mothers may have given answers that they felt the researcher wanted to hear. There were also issues in communication, as a range of languages and cultural milieus were encountered over the course of the study, and sensitive topics of maternal health were discussed. Although the qualitative study was conducted as soon as was feasible after MIRA's Phase II data collection had ended, several mothers had a period of up to a year between the events immediately postpartum which they were asked to recall, and qualitative interview.

Despite these difficulties in establishing what mothers may have done with their first breastmilk and why, it is also notable that there was a great deal of consistency in responses, across all types of source. Perceptions and behaviours relating to *khil* were almost universal, the vast majority of mothers appeared to recognise *bigouti* (colostrum), and a limited number of perceptions and practices relating to colostrum were repeatedly identified. Negative ideas that colostrum causes evil spirits to enter the infant, that it causes illness, that it is dirt, or otherwise harmful, were each expressed by a proportion of the sample, not by isolated cases, with substantial agreement between sources for each theme. When mothers described how they discarded their first milk, they repeatedly reported that they 'threw then fed', or expelled a limited number of 'squeezes' – while there was some variation in the specific quantities and practices reported for discarding, there was also an overall consistency in that apparently only small amounts were discarded.

While caution is necessary in interpretation of the qualitative results, there is consistent evidence to suggest that mothers who discarded colostrum did expel only a proportion (rather than most or all) of their first milk, with a limited number of themes explaining their choice to do so. It is also notable that the findings of the

qualitative study were somewhat consistent with previous observations in Madhya Pradesh, India, where a proportion of mothers were found to discard several drops of breastmilk before initiating feeding, and mothers who initiated breastfeeding after one or two days did not necessarily discard any colostrum[214]. In a follow-up qualitative investigation as part of the above study, 20% of interviewed mothers reported that they found colostrum to be harmful, and they discarded an amount ranging from a few drops to a few spoonfuls.

(ii) Could discarding a modest amount of first milk significantly affect risk of neonatal mortality? Section 1.5 highlighted that the volume of breastmilk produced in the first 24-48 hours postpartum is small – it is likely that less than 100ml are produced in the first day[221,222]. It was also described how concentrations of lipid, protein, sugars, and a wide range of micronutrients are unique in colostrum compared to transitional and established breastmilk (Figures 1.6 and 1.7). The content of colostrum is low in energy but high in factors related to immunological function and newborn gut cell development, such as IgA, IgG and lactoferrin (Figure 1.8), suggesting that colostrum may primarily play an immunological role[218]. Newborn farm animals that do not receive colostrum are at a greatly increased risk of mortality[254,261-265].

Given that small total amounts of colostrum are produced, and that it has a unique composition and role, a significant impact of discarding some of it might reasonably be anticipated. Section 1.6 summarised hypothesised causal pathways through which colostrum discarding might affect neonatal mortality risk. The hypothesised pathways were:

i. Impaired mother-to-infant immune transfer with subsequent increase in incidence and severity of infection, leading to increased risk of death caused by infection.

ii. Reduced probiotic gut colonisation, and reduced infant colonisation by other maternally-sourced microorganisms, in turn reducing competitive inhibition of establishment of pathogenic bacteria, and influencing immune development and gut permeability, leading to increased risk of infectious causes of death.

iii. Reduced intake of growth factors, lactoferrin and other agents involved in intestinal cell proliferation, leading to less established gut development and permeability, influencing infection risk.

iv. Impaired early suckling behaviour influencing later breastfeeding success and mother-infant bonding, potentially increasing risk of late neonatal mortality.

v. Reduced fluid, electrolyte and energy intake immediately postpartum, influencing metabolic function and risk of dehydration and electrolyte imbalance, and hypoglycaemia.

vi. Reduced maternal contact potentially associated with discarding of colostrum, increasing risk of hypothermia.

The outlined pathways (i), (ii) and (iii) all pertained to infection as an intermediate stage before infection-specific mortality. The fact that infection-specific neonatal mortality was more strongly affected by colostrum discarding than all-cause neonatal mortality suggests that at least some of these three pathways apply. The association between colostrum discarding and suspected acute respiratory infection in Makwanpur lends some weight specifically to pathway (i) above, of colostrum's role in general mother-to-infant immune transfer. Since the quantitative analysis exclusion criteria meant that few instances of death attributable to hypothermia remained in analysed datasets (Figures 5.2 and 6.2), the significant results are unlikely to be due to hypothermia risk and so no conclusion can be drawn on the applicability of hypothesised pathway (vi). Little evidence was generated in the thesis that permits comment on pathways (iv) and (v), other than that they are theoretically plausible and colostrum discarding was also significantly associated with all-cause neonatal mortality.

Overall, there are several plausible biological mechanisms through which discarding some colostrum might influence neonatal mortality risk, particularly infection-specific mortality. Supporting at least some of these mechanisms is the fact that infection-specific neonatal mortality displayed larger odds ratios than all-cause mortality in both study sites. It appears possible for mothers to discard some of their colostrum while also initiating breastfeeding early, suggesting that such infants receive some but not all of the colostrum potentially available to them. Mothers were literally

asked the question “before feeding the baby for the first time, did you squeeze and throw the (colostrum) milk?” – the wording of this question does not imply that mothers could not also initiate breastfeeding early while reporting that they discarded some colostrum. Breastfeeding initiation time and colostrum discarding may be treated as distinct and important dimensions of early infant feeding.

8.4 RECOMMENDATIONS AND NEXT STEPS

The evidence presented in the thesis has revealed a number of areas demanding further attention, and has highlighted advisable next steps. These include external validation of the quantitative results observed in Makwanpur and Dhanusha, further investigation of the effect of colostrum discarding and breastfeeding initiation time on specific causes of neonatal morbidity and mortality to establish predominant causal pathways, inclusion of colostrum discarding as a question in future community-based surveillance systems, further study of what mothers do with their first breastmilk when they 'discard' it, dissemination of the findings to date, and advocacy for recommendations to not discard colostrum in global public health policy and breastfeeding promotion efforts. As a potential new dimension of early infant feeding, colostrum discarding has scope for a firmer evidence base, and demands a greater understanding of what mothers may do with their first milk and why, with the ultimate aim of reducing the prevalence of colostrum discarding.

8.4.1 External validation of quantitative results

Colostrum discarding was found to have a significant and comparable effect on neonatal mortality risk in Makwanpur and Dhanusha, lending consistency to the observed results. However, data collection systems were similar in both locations, and although geographically and culturally divergent, they both represent populations in the central region of Nepal. A more robust statement of generalisability could be made if the same effect was observed elsewhere and under different study conditions.

Such data have, in fact, already been collected. The Pakistan DHS survey 2006-07 and the Ethiopia DHS survey 2005 collected data on colostrum discarding in addition to other aspects of early infant feeding, which was alluded to in Section 1.4. Analysis of these datasets would reveal whether the relationships between the early infant feeding dimensions and neonatal mortality observed in data collected by MIRA can be replicated elsewhere. This represents an obvious immediate next step, offering potential external validation of the results observed so far.

Similarly, the community-based surveillance system of Ekjut, an NGO operating in Jharkhand and Orissa states of India that also implements women's groups, has collected a range of data comparable to that of MIRA. The Ekjut surveillance included a question asking mothers whether they discarded their first milk before starting to breastfeed, in addition to several other variables related to early infant feeding, and will afford the opportunity to attempt replication of the analyses presented in the thesis.

While comparable results on the influence of delayed breastfeeding initiation time on neonatal mortality have now been observed in four sites (including rural Ghana and Sarlahi district of Nepal), scope remains for replication of these findings in the data of the Pakistan DHS, Ethiopia DHS and Ekjut surveillance.

8.4.2 Further quantitative investigation and meta-analysis

Section 8.3 outlined six pathways through which colostrum discarding was hypothesised to potentially affect neonatal mortality. Of these, pathways (ii) and (iii) may be expected to particularly affect risk of enteric infection, and pathway (i) is applicable to all sources of infection. Analysis of a relationship between colostrum discarding or breastfeeding initiation time and diarrhoeal morbidity was attempted in the thesis. However, the available measure (asking mothers if their infant had loose stools) lacked specificity. In order to better understand the pathways through which colostrum discarding and delayed initiation time might influence neonatal mortality risk, further studies may be designed with the capacity to measure diarrhoeal incidence. Mothers might, for example, be asked to keep an ongoing diary of their infant's health in the neonatal period, or receive weekly or fortnightly visits, instead of one instance of recall after completion of the neonatal period.

The hypothesised causal pathways included the possibility that hypothermia risk is increased for infants of mothers who discarded colostrum. While this specific cause of mortality was too rare in Makwanpur and Dhanusha to be included as an outcome measure in analyses, investigation of the risk of hypothermia-specific mortality may be possible in other settings.

More generally, a surveillance system specifically designed to investigate the effect of early infant feeding practices on neonatal mortality or morbidity outcomes might include two visits by interviewers: the first visit occurring a week or several days postpartum, followed by another visit after completion of the neonatal period. This would limit the maternal recall time between events immediately postpartum and surveillance, but would also allow collection of data on events occurring throughout the neonatal period.

Synthesising the evidence that has been accumulated about the effect of delayed breastfeeding initiation time on neonatal mortality, the results of Makwanpur, Dhanusha, Ghana and Sarlahi district could be pooled for meta-analysis, as long as measures of exposure, outcome and inclusion criteria were compatible. The scope

for meta-analysis of the effect of colostrum discarding may also be presented after completion of data collection in Ekjut.

8.4.3 Inclusion of questions on colostrum discarding and breastfeeding initiation time in the community-based surveillance of other studies

A body of evidence could rapidly be accumulated on the topic if community-based surveillance systems set up by other research teams and NGOs also included items on early infant feeding, in the course of investigation of other research topics. Given that the findings of the thesis have revealed a potentially important dimension of early infant feeding, addition of an extra question in the surveillance of researchers and NGOs working in international health could rapidly produce relevant data with minimal extra cost.

8.4.4 Further investigation of what mothers do with their first breastmilk, and what is meant by 'colostrum discarding'

The qualitative component of the thesis may be seen as exploratory. A broad understanding was achieved that some mothers discard colostrum and some do not, and this was supported by a range of underlying perceptions of first milk. However, the study highlighted the need to conduct research that allows for a more in-depth understanding of the early infant feeding events that occur in the hours and days following birth.

How might a question about colostrum be rephrased in future studies to give greater clarity to the topic? Under the current phrasing of the question in the MIRA surveillance, 'did you throw away your first milk before feeding the baby for

the first time?', a researcher can only discover if a mother discarded some colostrum or no colostrum. The current phrasing benefits from the fact that it is relatively unambiguous, and all possible behaviours fall into the zones of 'yes' or 'no' as available closed responses. However, it does not elucidate any detail on the volumes of milk discarded. Several approaches could be taken in future questionnaire designs to give more clarity. One option is a further question following from 'did you throw away your first milk before feeding the baby for the first time?', asked only in instances of a positive response. For example, if mothers said that they did discard some of their first milk, the following question could be 'how much did you throw away?' Alternatively, mothers could be asked 'did you throw away all of your first milk?' Such further questions would differentiate any differences between mothers that may have discarded only some of their colostrum, compared to those who made a concerted effort to discard as much as possible, while adding minimal cost or complexity to existing questionnaire and study designs.

How might more detailed studies of the volume of colostrum given or discarded be designed? There are a number of potential approaches to achieving this. One of the most basic and probably effective approaches would be direct observation, or even filming, of a small number of mothers immediately following birth, in environments that include the home or the hospital maternity unit. However, such a method might be intrusive for mothers, and might even influence what they do with their first breastmilk. Observation or filming could be complemented by semistructured interviews in a similar vein to that of the thesis, but with a shorter timeframe between birth and interview, and potentially with a greater amount of time devoted to establishment of relationships before data collection, with fewer mothers interviewed in total. There is also scope for a comparative ethnography of early infant feeding and breastfeeding in Makwanpur and Dhanusha districts.

Challenges to any method that attempts to measure or observe quantities of colostrum discarded include the fact that the observation itself may be intrusive and change the behaviours of mothers, it is hard for a researcher to know precisely when a birth will occur and so be present during an initial feeding event, and any precise measurement in grams of colostrum received by a suckling newborn infant is not feasible. Difficulties in being present during initial feeding events could be

mitigated by limiting research to a population of mothers giving birth in a clinical environment, although this introduces selection bias into the study design.

Consideration of how future questions on colostrum might be phrased, and how more detailed studies of the volume of colostrum given might be designed, need not be approached as separate issues. Mothers whose initial feeding practices are observed or filmed could also be asked questionnaire items in the vein of 'how much of the first milk did you throw away?' or 'did you throw away all of your first milk?' in order to validate the sensitivity and specificity with which given questionnaire responses equate with observed volumes of colostrum discarding (or ranges or categories of volumes discarded). If validation of questionnaire responses with observed discarded quantities was performed for a sub-selection of the study sample (for example, 10%, or mothers giving birth in hospital), then specific volumes discarded by the remaining proportion of the sample could be estimated based on their questionnaire responses.

Are there intervention studies which might be recommended? It is heartening to note that in Appendix A and section 1.3 it was outlined that of 17 interventional studies described for the promotion of an early infant feeding practice, all but one were successful in significantly altering behaviours. 11 of these were randomised or cluster-randomised controlled trials; six were before-and-after studies. The most typical strategies adopted were peer-based counsellor support and health care worker assistance, or community-based behaviour change management.

It must be remembered that in Makwanpur and Dhanusha districts of Nepal, there already exist relevant cluster-randomised controlled trials of behaviour change interventions – the trials implemented by MIRA. Within the framework of women's groups, which already address newborn care behaviours in their participatory community action cycle, additional content could be included within the existing information delivery framework to promote the feeding of colostrum. It is notable that the majority of interventions highlighted in the literature review of section 1.3 and Appendix A specifically focus on promoting an aspect of early infant feeding, as opposed to a range of newborn care behaviours, with some exceptions[164,174]. A range of interventions might be envisaged that focus on health care worker support or community-based behaviour change management as strategies to improve

specifically the rate of feeding of colostrum and the understanding of its importance within communities. However, a more holistic and cost-effective approach would be to include the promotion of colostrum feeding within a more comprehensive package of essential newborn care, potentially akin to that described by Kumar et al.[164], but most feasibly building upon the existing experience of MIRA and their implementation of women's groups. The prevalence of colostrum feeding or discarding can be measured as a separate outcome even when the intervention influences multiple behaviours.

8.4.5 Dissemination

The discarding of colostrum is a little-studied yet apparently important dimension of early infant feeding. The potential benefit of optimising early infant feeding in developing country community settings, and at minimal cost, deserves greater recognition and attention through dissemination of the findings. At the time of writing, preliminary results of the thesis have been disseminated to the Perinatal Society of Nepal, within UCL, the Institute of Child Health, and internally within the MIRA NGO. Scientific journal publication is necessary, and dissemination will take further forms which may include public radio broadcast within Makwanpur and Dhanusha districts, dissemination to the District Health Offices of Makwanpur and Dhanusha, presentations at scientific conferences, communication with pro-breastfeeding organisations such as La Leche League, and communication with international policy and donor organisations and selected child health researchers. The results will also be relayed to the mothers of Makwanpur and Dhanusha via methods that include the MIRA women's groups.

The following journals are of particular potential as mediums for dissemination:

- American Journal of Clinical Nutrition
- Journal of Nutrition
- Tropical Medicine and International Health
- International Health

- Journal of Perinatology
- Archives of Disease in Childhood
- Pediatrics
- Journal of Human Lactation

8.4.6 Implications for breastfeeding recommendations, promotion programmes and policy

Section 1.3 and Appendix A highlighted that breastfeeding promotion programmes can have a major impact on several dimensions of early infant feeding. At least one study has already demonstrated that a mass media campaign can influence the proportion of mothers reporting knowledge about colostrum[179]. However, many more studies have focused only on breastfeeding initiation time[150,154,164,174-176], prelacteal feeding[142,150,154,164], or established breastfeeding[139-143,175], as promotion outcomes, typically measured during the infant period but after the neonatal period. It is recommended that future trials of breastfeeding promotion programmes include consideration of colostrum discarding, in addition to attempts to maximise the uptake of exclusive breastfeeding and early initiation. Such trials of efforts to change early infant feeding practices could measure neonatal mortality and morbidity indicators as primary outcomes, with comparison made on an intention-to-treat basis.

The results of the thesis have highlighted that events in the first hours and days postpartum have a major bearing on outcomes throughout the neonatal period, and should receive emphasis in public health policy and promotion. Inequities and difficulties in healthcare access accentuate the need to identify strategies that are effective within developing country communities, which can achieve universal coverage, and which to do not necessarily involve skilled obstetric care in health facilities or high technology. Calculations of population attributable risk in Makwanpur implied that 8% of all neonatal deaths (and 30% of deaths amongst the

low risk analysed sample of singletons born at term who initiated breastfeeding and survived 48 hours) could be avoided if no mothers discarded colostrum. 5% of all neonatal deaths (10% of low-risk deaths) could be avoided in Dhanusha. Evidence on breastfeeding promotion programmes indicates that they are largely effective (Section 1.3 and Appendix A). Policy and promotion efforts to reduce neonatal mortality would benefit from drives to reduce the prevalence of colostrum discarding, alongside increasing the prevalence of early initiation, exclusive breastfeeding and other community practices such as care-seeking for illness. Such goals may be achieved by methods including women's groups. Prevention of colostrum discarding can be viewed as an important component of optimal newborn care practice, alongside other newborn care practices such as provision of warmth in the delivery environment, delayed bathing, or immediate skin-to-skin contact.

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APPENDIX A: SUMMARY OF REVIEWED STUDIES IN EARLY INFANT FEEDING [a]

[a] Note: References in Appendix A [in parentheses] refer to reference numbers in the above Reference List.

(A) Any breastfeeding - morbidity and mortality outcomes

Source	Year	Location	Type of Study	Intervention/ Basis of Comparison	Sample Size	Relevant Outcomes	Comments, Strengths, Limitations
WHO Collaborative Study Team on the Role of Breastfeeding on the Prevention of Infant Mortality [Ref 96]	2000	Brazil, Pakistan, Philippines	Meta-analysis	No breastfeeding vs. any breastfeeding	1223 infants	Infant mortality; OR 5.8 [3.4-9.8] ages 0-1 months inclusive. Infant diarrhoea; OR 6.1 [4.1-9.0] ages 0-6 months. Infant ARI; OR 2.4 [1.6-3.5] ages 0-6 months	All deaths occurring in first week of life excluded. Stratification by potential confounding covariates. Includes data cited elsewhere in thesis from south Brazil [Ref 113], and Philippines [Ref 115]
Choe MK, Retherford RD, Gubhaju BB, Thapa S. [Ref 74]	1989	Nepal, national	Descriptive; cross-sectional national survey	No breastfeeding (including weaned infants) vs. any breastfeeding	5940 ever-married women aged under 50	Early childhood mortality (between birth and second birthday). RR 4.17	Based on data from 1976 Nepal Fertility Survey. Data suffers from age misreporting and heaping. Assumption that all infants breastfed in first month. Hazard models including most possible covariates available in dataset, five different models produced; presented breastfeeding relative risk is average of five models
Victora CG et al. *1987* [Ref 113], and Victora CG et al. *1989* [Ref 114]	1987 and 1989	Southern Brazil, urban	Descriptive; case-control study	Breast only vs formula milk only or cow's milk only (other categories were breast + formula and breast + cow)	1071 infants (357 cases, 714 controls)	Cause-specific infant mortality by infection type. Infant diarrhoea; aOR 14.2 [5.9-34.1] . Infant respiratory infection; aOR 3.6 [1.7-7.5]. Other infections; aOR 2.5 [1.0-6.4]	Adjusts for several confounders. Excludes: infants <1500g, non singletons, congenitally malformed. Excluded early neonatal deaths. Victora et al. 1989 present data from same source as Victora et al. 1987 but with more detailed study of diarrhoea-specific infant mortality
Yoon PW et al. [Ref 115]	1996	The Philippines, urban and rural	Descriptive; prospective longitudinal study	No breastfeeding vs. any breastfeeding (status immediately prior to illness)	9942 infants	Cause-specific infant mortality, age 0-5 months. Diarrhoea; RR 9.7 [4.0-25.0]. ARI; 0.4 [0.09-1.9]	Non-signifcant association with acute lower respiratory infection mortality in infants 0-5 months. Adjusts for a number of variables

Feachem RG and Koblinsky MA [Ref 116]	1984	35 developing and developed countries	Review	Exclusive breastfeeding, partial breastfeefing, no breastfeeding	N/A	Infant diarrhoea morbidity and mortality for several timeframes in infant period. E.g. pooled results of 16 studies: diarrhoeal morbidity, age 0-3 months, no breastfeeding vs. partial or exclusive, RR 3.0. Overall 83% of studies - exclusive breastfeeding protective vs. partial for infant diarrhoeal morbidity; 88% of studies - exclusive breastfeeding protective vs. no breastfeeding for infant diarrhoeal morbidity; 76% of studies - partial breastfeeding protective vs. no breastfeeding for infant diarrhoeal morbidity	Pooled results for a number of overlapping outcomes. No confidence interval estimates. Several methodologies and definitions between studies, limiting comparability. Several studies pre-1950. Confounders not always accounted for. No indication of relative weighting given to different studies when producing composite relative risks
Nacify AB et al. [Ref 117]	1999	Northern Egypt, rural Nile Delta	Descriptive; prospective cohort study	Any breastfeeding vs. no breastfeeding	272 infants	Infant rotavirus diarrhoea; aHR 0.35 [0.13-0.94] (expressed as protective effect of breastfeeding)	Analyses repeated, limited to several sub-groups, significant association always observed in infants aged under 1 year, but not if all children under 2 years included. Adjustment for age and season. Definition of a "diarrhoeal day" may have led to under-detection of diarrhoea in breastfed infants
Meremikwu MM, Asindi AA, Antia-Obong OE [Ref 118] [abstract and PubMed PIP only]	1997	Nigeria	Descriptive; case-control study	No breastfeeding vs. any breastfeeding	1133 children	Prevalence of persistent diarrhoea, age 0-3 years; significant difference at 5% level	Odds ratios and confidence intervals not presented. No adjustment for potentially confounding covariates. No stratification by age group
Mølbak K et al. [Ref 119]	1997	Guinea-Bissau, periurban	Descriptive; prospective cohort study	Exclusive breastfeeding, partial breastfeefing, no breastfeeding	1314 children	Diarrhoea incidence, age 0-4 years; no breastfeeding vs. partial breastfeeding RR 4.40 [1.59-12.12]	Breastfeeding reduced the number of other variables associated with diarrhoea. Usage of GEE in analysis. Non-significant difference between exclusively and partially breastfed children
Mahmood DA, Feachem RG and Huttly SRA [Ref 120]	1989	Iraq, urban, hospital based	Descriptive; case-control study	Exclusive breastfeeding, partial breastfeefing, no breastfeeding	1320 infants (597 cases, 723 controls)	Hospitalised diarrhoea, age 2-3 months; partial breastfeeding vs. exclusive breastfeeding RR 6.2 [2.8-14.0]; no breastfeeding vs. exclusive breastfeeding RR 36.7 [14.6-92.4]	Infant controls adequately selected from similar environment as diarrhoeal cases. Several potentially confounding variables controlled for. Only one hospital in Basrah during study, so no risk/population difference between sites.

Brown KH et al. [Ref 121]	1989	Peru, periurban	Descriptive; prospective longitudinal study	Multiple comparison groups, including exclusive breastfeeding vs. no breastfeeding (artificial milk feeding)	153 infants	Diarrhoea incidence, age 0-2 months; no breastfeeding vs. exclusive breastfeeding RR 2.80. Diarrhoea prevalence, age 0-2 months; no breastfeeding vs. exclusive breastfeeding RR 3.43	Small sample size. Significant association of no breastfeeding vs. exclusive breastfeeding for upper respiratory tract infection also observed. Relative risks unadjusted for potential confounding variables.
Perera BJ et al. [122]	1999	Sri Lanka, hospital-based	Descriptive; case-control study, retrospective recall	No breastfeeding, exclusive breastfeeding for 3 months or less, exclusive breastfeeding for more than 3 months	343 infants (285 cases, 58 controls)	Disease-specific infant morbidity. Respiratory infection hospitalisation, exclusive breastfeeding > 3 months vs. no breastfeeding, highly significant. Diarrhoeal illness hospitalisation, exclusive breastfeeding > 3 months vs. no breastfeeding, highly significant.	Study outcomes not clearly defined. Incomplete comparison of different breastfeeding groups - no single reference category. No expression of relative risks or 95% CI.
Lopez-Alarcon M, Villalpando S and Fajardo A [Ref 123]	1997	Mexico, urban	Descriptive; prospective cohort study	Full breastfeeding, partial breastfeeding, no breastfeeding (formula)	170 infants	Incidence and prevalence of ARI and diarrhoea, stratified by age in months. Neonatal ARI incidence no breastfeeding vs. full breastfeeding; RR 5.56 [3.6-8.5]. Neonatal diarrhoea incidence no breastfeeding vs. full breastfeeding; non-significant	Sample size small, so that individual episodes of ARI or diarrhoea could affect the apparent RR. For example, only one neonatal episode of diarrhoea was observed in the group of formula fed infants (21 infants), so type II error likely. Several potential confounding variables adjusted for.
César JA et al. [Ref 124]	1999	Southern Brazil, urban	Descriptive; nested case-control study	Breast only, breast and formula, formula only	2543 infants (152 cases, 2391 controls)	Infant hospital admission for pneumonia. No breastfeeding vs. exclusive breastfeeding, age 1-3 months; aOR 61 [19.0-195.5]	Very large control group compared to cases. Effective identification of and adjustment for multiple potential confounding variables.
Ashraf RN et al. [Ref 125]	1991	Pakistan, urban	Descriptive; case-control study	No breastfeeding vs. partial breastfeeding (including one exclusively breastfed infant)	312 neonatal infants (42 cases, 270 controls)	Neonatal septicaemia; OR 18 [7.9-37.7]	Cases from hospital environment, controls from community environment, introduces potential source of bias. Excluded infants aged two days or less. Matched cases and controls

(B1) Established breastfeeding - mortality and morbidity outcomes

Source	Year	Location	Type of Study	Intervention/ Basis of Comparison	Sample Size	Relevant Outcomes	Comments, Strengths, Limitations
Arifeen S et al. [Ref 130]	2001	Bangladesh, urban	Descriptive; prospective cohort study	Exclusive breastfeeding vs. non-exclusive breastfeeding (including partial and no breastfeeding)	1677 infants	Cause-specific infant mortality. Infant ARI mortality; aOR 2.40 [1.14-5.04]. Infant diarrhoea mortality; aOR 3.94 [1.47-10.57]. All-cause infant mortality; aOR 2.23 [1.45-3.44]	Cause of death assigned via verbal autopsy and algorithm of several steps. Several measured confounding variables controlled for. Birth weight estimated from measurements taken up to 13 days after birth.
Bahl R et al. [Ref 131]	2005	Ghana, India, Peru	Descriptive; multicentre cohort study	Exclusive, predominant, partial, no breastfeeding	9424 infants	Infant mortality, age 6 weeks to 6 months, partial vs. predominant breastfeeding; aHR 2.46 [1.44-4.18]. Diarrhoea-specific mortality, age 6 weeks to 6 months, partial vs. predominant breastfeeding; aHR 3.37 [1.46-7.75]	Does not include neonatal period in surveillance. Adjusted for multiple potential confounding variables. Non-significant but suggestive association between predominant and partial breastfeeding for ALRI-specific mortality.
Plank SJ and Milanesi ML [Ref 133]	1973	Chile, rural	Descriptive; retrospective cross-sectional study	Partial vs. full breastfeeding	1712 mothers interviewed	Infant mortality. Difference in crude mortality rates observed, however no indication of significance or 95% CI.	Risk of recall bias. Infants under age 1 month not included. Most recent birth selected in cases of multiparity.
Habicht J, Da Vanzo J, Butz WP [Ref 134]	1986	Malaysia, national	Descriptive; cross-sectional national survey, recall data	Partial vs. full breastfeeding	1262 ever-married women aged under 50	Neonatal mortality (deaths age 8-28). Protective effect of full breastfeeding compared to partial breastfeeding - no indication of relative risks, 95% CI, statistical significance	Based on data from 1976/77 Malaysian Family Life Survey. Exclusion of deaths on first day, breastfeeding non-initiators, and infants reported too ill to breastfeed.
Edmond KM et al. [Ref 138]	2007	Ghana, rural	Descriptive; prospective cohort study (data source from cluster randomised trial)	Exclusive, predominant, partial breastfeeding	10942 breastfed neonatal infants aged 2-28 days	Infection-specific neonatal mortality, partial vs. exclusive breastfeeding; aOR 5.73 [2.73-11.91]. Non-infection specific mortality; association not statistically significant.	Large sample size. Excluded neonatal deaths in the first two days postpartum and breastfeeding non-initiators. Wide range of potentially confounding variables adjusted for, including prelacteal feeding and breastfeeding initiation time. Accomodation for clustered nature of data via robust standard errors, and data may not have been greatly clustered, hence no usage of random effects modelling or GEE

Mullany LC et al. [Ref 139]	2008	Southern Nepal, rural	Descriptive; prospective cohort study (data source from community-based randomised trial)	Partial vs. exclusive breastfeeding	22838 neonatal infants	Neonatal mortality. RR 1.77 [1.32-2.39].	Paper presented primarily to investigate breastfeeding initiation time and neonatal mortality, results discussed below. Large sample size. Excluded neonatal deaths in the first two days postpartum and breastfeeding non-initiators. Unclear what potential confounding variables were adjusted for. No presentation of cause-specific mortality.
Clemens J et al. [Ref 135]	1999	Egypt, rural	Descriptive; prospective cohort study	Exclusive breastfeeding, "partial breastfeeding" (including predominantly breastfed infants by definitions used in the thesis), no breastfeeding	198 breastfed infants	Infant diarrhoea rate, infants under 6 months of age, exclusive vs. no breastfeeding; aRR 0.67 [0.47-0.97]. "Partial" vs. no breastfeeding; 0.72 [0.52-1.01]. (i.e. protective effect of exclusive breastfeeding, suggestive but non-significant associationfor partial breastfeeding)	Adjustment for a number of covariates including ownership of several assets, infant sex, maternal education, and birth site. Analysis took into consideration clustered nature of data. Study uses definitions inconsistent with other published material, classifying "partial breastfeeding" as any instance where breastmilk as well as any other liquid or solid were fed to the infant
Mihrshahi S et al [Ref 136]	2008	Bangladesh, rural	Descriptive; prospective cohort study (data derived from RCT)	Non-exclusive vs. exclusive breastfeeding.	272 mother-infant pairs, to infant age 6 months	7-day prevalence of diarrhoea; aOR 2.50 [1.10-5.69], p=0.03. 7-day prevalence of ARI; aOR 2.31 [1.33-4.00], p<0.01	22.5% of enrolled women did not complete the study to 6 months, and participants who withdrew had different data across several baseline characteristics measured compared to participants completing to 6 months. 'Non-breastfeeding' not available as comparison category to exclusive breastfeeding because so few infants were not breastfed. Adjustment for several potentially confounding covariates

Monterrosa EC et al. [Ref 137]	2008	Mexico, urban, hospital-based	Descriptive; prospective cohort study	Predominant breastfeeding vs. non-predominant breastfeeding (including partial breast-feeding and formula feeding combined)	154 infants to age 6 months	Gastrointestinal infection incidence; aOR 0.4 [0.2-1.0] (p=0.04) (i.e. expressed as protective effect). Iron deficiency (serum ferritin < 12 µg/L); aOR 9.2 [2.3-37.0]	Predominant breastfeeding had protective effect for gastrointestinal infection but greatly increased the risk of iron deficiency, compared to non-predominant breastfeeding. Study population restricted to mothers without diabetes, HIV/AIDS, obesity, eclampsia-preeclampsia or anemia during pregnancy, and recruited infants were singletons born at term weighing > 2.5kg. 38% of enrolled mothers did not complete the study; baseline characteristics suggest that these mothers tended to have received less education than mothers remaining enrolled. Partial and non-breastfeeding groups both received formula; the formula was fortified with iron. A small number of women exclusively breastfed their infants for at least 1 month and it is unclear how they were classified in the analysis comparison groups.

(B2) Established breastfeeding - promotion outcomes

Source	Year	Location	Type of Study	Intervention/ Basis of Comparison	Sample Size	Relevant Outcomes	Comments, Strengths, Limitations
Morrow AL et al. [Ref 140]	1999	Mexico, periurban	Interventional; community-based randomised trial	Home-based peer counselling; two intervention groups, three and six visits, control group with no visits	130 mother-infant pairs	Exclusive breastfeeding frequency. At 3 months postpartum, exclusive breastfeeding by 67% of six-visit group, 50% of three-visit group, 12% of control group. Statistically significant difference between each pair of groups.	Of 170 women originally approached, 40 excluded, but the characteristics of those excluded did not differ from included participants. Randomisation occurred at cluster level, not individual participant level. Participant characteristics somewhat unequal between groups.
Anderson AK et al. [Ref 141]	2005	USA, inner city Hartford, Conneticut, predominantly Latina community	Interventional; randomised trial	Peer counsellor support for exclusive breastfeeding; intervention group with peer counseling support and conventional breastfeeding support, control group received existing breastfeeding support only	135 expectant mothers less than 32 weeks gestation and below 185% of the federally-defined poverty level	Non-exclusive breastfeeding, 24 hour recall, 1 month postpartum. RR 1.41 [1.16 1.71].	Participant recruitment through prenatal clinic records, however peer counseling visits done at home. Several criteria for participant exclusion, including pre-term birth and LBW - participants had to be "healthy" for inclusion, no clear definition provided. Although intervention/control group allocation randomised, some evidence of differential in participant characteristics between groups.
Kramer MS et al. [Ref 142]	2001	Belarus, hospital and clinic based	Interventional; cluster-randomised trial	16 intervention sites received programme modeled on Baby Friendly Hospital Initiative including health care worker assistance in breastfeeding support, 15 control sites continued existing policies	16491 mother-infant pairs across 16 intervention and 15 control sites	Prevalence of predominant and exclusive breastfeeding at 3 months. 43.3% vs. 6.4%; p<0.001.	Effects on infant gastrointestinal tract infection, and atopic eczema, also statistically significant between intervention and control groups. Formula feeding prevalent in population where study occurred. Analysis accounted for clustered nature of data.
Bhandari N et al. [Ref 143]	2003	India, Haryana state	Interventional; cluster-randomised controlled trial	Community-based breastfeeding counselling. Control sites received routine services	895 infants across 4 intervention sites and 4 control sites	Exclusive breastfeeding at 3 months; OR 4.02 [3.01-5.38]. Initiation of breastfeeding within 3 hours; OR 3.1 [2.05-4.69]. Prelacteal feeds given within first 3 days of life; 0.15 [0.09-0.24]	Analyses adjusted for cluster randomisation. Significant reduction in diarrhoea incidence between intervention and control clusters also described. Precise nature of intervention unclear.

Haider R et al. [Ref 176]	2000	Bangladesh, urban	Interventional; cluster-randomised controlled trial	Peer counselling, including visits in third trimester of pregnancy and first five months after birth	726 mother-infant pairs across 40 clusters, women aged 16-35	Prevalence of exclusive breastfeeding at 5 months: 70% for intervention group, 6% for control group, difference=64% [57%–71%], p>0·0001	Further beneficial effects: proportion of infants receiving prelacteal feeds, exclusive breastfeeding at day 4 after birth. Large number (32%) of enrolled participants subsequently left study or excluded - no exploration of whether excluded participants differed in characteristics. Distribution of breastfeeding initiation times described as skewed, but frequencies of different initiation times not expressed in results
Aidam BA, Pérez-Escamilla R and Lartey A [Ref 144]	2005	Ghana, urban	Interventional; randomised controlled trial	Exclusive breastfeeding counselling and education. Two intervention groups: 1 group received lactaction support pre-, peri- and postnatally; the other intervention group only peri- and postnatally. Control group received other health education	136 pregnant women followed until 6 months postpartum	Exclusive breastfeeding in the previous month, measured at 6 months postpartum. Intervention group 1, 90.0%; intervention group 2, 74.4%; control group, 47.7% (p=0.008)	Makes allowance for the 'Hawthorne effect', whereby contact with research personnel as opposed to the counselling intervention per se may through some mechanism increase exclusive breastfeeding rates and introduce bias between intervention and control groups. Breastfeeding status self-reported and may introduce social desirability bias

(C1) Prelacteal feeds - mortality and morbidity outcomes

Source	Year	Location	Type of Study	Intervention/ Basis of Comparison	Sample Size	Relevant Outcomes	Comments, Strengths, Limitations
Leach A et al. [Ref 160]	1999	The Gambia, rural	Descriptive; matched case-control study	Prelacteal feeding	32164 neonatal infants	Late neonatal mortality. aOR 3.38 [1.44-7.93]	Effectively a smaller sample size than indicated because case-control component of study included only a subgroup of cases of neonatal death occurring within a one-year time-frame, with two matched controls for each case. Analysis included twins. No indication of which confounding variables included in model. Early neonatal deaths not included in relevant analysis reported here. Some risk of reverse causality remains, as authors acknowledge that babies born with problems were not excluded and may have been treated differently
Hossain MM et al. [Ref 150]	1992	Egypt, rural	Descriptive; prospective cohort study	Prelacteal feeding	152 singleton neonates	Infant diarrhoea incidence per unit time, age 0-11 weeks; adjusted incidence density ratio 1.4 [1.0-2.0]	Marginally significant result, and association non-significant in later months of infant age. Continuous variables were dichotomized for analysis; loss of information. Adjustment for a wide range of potentially confounding variables.
Edmond KM et al. [Ref 138] [also detailed above under table section B1]	2007	Ghana, rural	Descriptive; prospective cohort study (data source from cluster randomised trial)	Prelacteal feeding	10942 breastfed neonatal infants aged 2-28 days	Infection-specific neonatal mortality; aOR 1.11 [0.66-1.86] (i.e. no association). Noninfection-specific neonatal mortality; aOR 1.33 [0.55-3.22] (i.e. no association)	Unadjusted odds ratios suggest doubled risk of infection-specific neonatal mortality in infants receiving prelacteal feeds compared to no prelacteal feeds, however relationship no longer significant after controlling for potentially confounding variables and when model refitted to exclude newborn infants at high risk of death.

(C2) Prelacteal feeds - initiatives to reduce their usage

Source	Year	Location	Type of Study	Intervention/ Basis of Comparison	Sample Size	Relevant Outcomes	Comments, Strengths, Limitations
Bradley JE and Meme J [Ref 151]	1992	Kenya, hospital-based: including city, provincial, religious	Interventional; before-after study	Government breastfeeding promotion programme; interviews with hospital workers and policy makers in 1982 and 1989, before and after programme	193 facilities (year 1982), 175 facilities (year 1989)	Reporting of routine giving of prelacteal feeding in facility. 1982; 93% of facilities. 1989; 48% of facilities	The nature of the prelacteal feeds also changed; milk-based prelacteal feeds particularly declined in importance. No details of nature of government promotion campaign. No indication of statistical significance or confidence intervals, however results appear to be dramatic.
Prasad B and Costello AMdL [Ref 155]	1995	India, Bihar state, hospital-based	Interventional; before-after study	10-day baby friendly training intervention for staff at district hospital, on initiation of breastfeeding and use of prelacteal feeds by mothers	172 mothers before intervention, 195 mothers immediately after, 101 six months later	Use of prelacteal feeds; 96% of control group, 43% of early follow-up group, 77% of late follow-up group	Prelacteal feeding reported to be more frequent in late follow-up group than early follow-up. Single explanations could affect mothers' behaviour, however continuing health worker education concluded to be necessary. No indication of statistical significance or confidence intervals
Bhandari N et al. [Ref 143] [also appearing under table section B2 above]	2003	India, Haryana state	Interventional; cluster-randomised controlled trial	Community-based breastfeeding counselling. Control sites received routine services	895 infants across 4 intervention sites and 4 control sites	Exclusive breastfeeding at 3 months; OR 4.02 [3.01-5.38]. Initiation of breastfeeding within 3 hours; OR 3.1 [2.05-4.69]. Prelacteal feeds given within first 3 days of life; 0.15 [0.09-0.24]	Analyses adjusted for cluster randomisation. Significant reduction in diarrhoea incidence between intervention and control clusters also described. Precise nature of intervention unclear.
Kumar V et al. [Ref 165]	2008	India, Uttar Pradesh state, rural	Interventional; cluster-randomised controlled trial	Community-based behaviour change management intervention. Two intervention groups, both receiving preventive package of interventions for essential newborn care, one also receiving hypothermia indicator. Control group received usual services	3762 singleton infants across 39 village administrative clusters	Prelacteal feeding; 38.4%, 33.5%, and 79.9%, in the essential newborn care intervention group, the intervention plus hypothermia indicator group, and the control group respectively. Both intervention groups vs. control arm; RR 0.43 [0.39-0.47], p<0.0001	Three arms of the trial similar in all measured characteristics at baseline survey. Total population of study area 104123. Intention to treat analysis undertaken. Analysis took into account clustered nature of data. Modification of many other essential newborn care behaviours also observed

(D1) Breastfeeding initiation time - mortality and morbidity outcomes

Source	Year	Location	Type of Study	Intervention/ Basis of Comparison	Sample Size	Relevant Outcomes	Comments, Strengths, Limitations
Edmond KM et al. [Ref 161]	2006	Ghana, rural	Descriptive; prospective cohort study (data source from cluster randomised trial)	Breastfeeding initiation time (within 1 hour, within day 1 but after first hour, day 2, day 3, after day 3)	10947 breastfed singleton neonatal infants surviving to day 2	Neonatal mortality. Within 1 hour vs. after 1 day; aOR 2.88 [1.87-4.42]	Difference in mortality risk between 'within 1h' group and 'from 1 h to end of day 1' suggestive but non-significant. Analysis adjusted for a wide range of potential confounding variables, including established breastfeeding pattern. Large sample size. Excluded neonatal deaths in the first two days postpartum and breastfeeding non-initiators. Significant trend towards higher mortality with increasingly delayed intiation of breastfeeding. No accommodation for clustered nature of data
Mullany LC et al. [Ref 139] [also appearing under section B1 above]	2008	Nepal, *terai* , rural	Descriptive; prospective cohort study (data source from cluster randomised trial)	Breastfeeding initiation time (within 1 hour, within first 24 hours but after first hour, day 2, day 3, after day 3)	22 838 breastfed neonatal infants surviving to 48 hours	Neonatal mortality. Within 24 hours vs. after 24 hours; aOR 1.74 [1.39-2.19]	Trend towards higher mortality with increasingly delayed intiation of breastfeeding. Effect more pronounced in *Pahadi* than *Madeshi* study participants. Effect more pronounced in LBW (<2500g) infants and premature (<37 weeks) infants. Mortality risk adjusted for a number of potential confounders including maternal literacy, ethnicity and infant sex, but no other aspects of early infant feeding.
Gunnlaugsson G, Da Silva MC and Smedman L [Ref 171]	1993	Guinea-Bissau, periurban	Descriptive; prospective cohort study	Breastfeeding initiation time (within 24 hours, 24 hours and later)	717 children up to 3 years of age	Postneonatal child survival. RR 0.90 [0.59-1.37]	Non-significant association. Adjustment for a number of covariates. Exclusion of infants unwell on day of birth. Study however included many child deaths in a time frame after when the initiation time of breastfeeding may be anticipated to impact upon survival. Small sample size and breastfeeding status unknown for half of the cases of infant or child death, allowing analysis only to be based on 46 deaths

Clemens J et al. [Ref 135] [also appearing under section B1 above]	1999	Egypt, rural	Descriptive; prospective cohort study	Breastfeeding initiation time (within three days, three days and later)	198 breastfed infants	Infant diarrhoea rate, infants under 6 months of age. aRR 0.74 [0.56-0.98] (i.e. protective effect of early initiation)	Adjustment for established breastfeeding pattern and a number of additional covariates including ownership of several assets, infant sex, maternal education, and birth site, despite characteristics of early and late initiators being broadly similar. Analysis took into consideration clustered nature of data
Badruddin SH et al. [Ref 172]	1991	Pakistan, urban, disadvantaged area	Descriptive; case-control study	Breastfeeding initiation time (within first day of life, after first day of life)	265 male children aged 6-36 months (100 with persistent diarrhoea, 79 with acute diarrhoea, 86 in comparison group)	Persistent diarrhoea, acute diarrhoea. 44% of persistent diarrhoea children initiated breastfeeding within day 1, vs. 58% in acute diarrhoea children and 76% in the comparison group. Difference between comparison and the two diarrhoea groups together is statistically significant, p <0.001	Several characteristics of different groups non-comparable. Odds ratios and confidence intervals not presented. No adjustment for potentially confounding covariates. Results tables expressed in such a way that the reader may interpret diarrhoea status as a determinant of breastfeeding initiation time, not vice versa
Gunnlaugsson G, Da Silva MC and Smedman L [Ref 173]	1995	Guinea-Bissau, periurban	Descriptive; case-control study	Breastfeeding initiation time (<6 hours, 6-11 hours, 12-23 hours, 24-35 hours, ≥ 36 hours)	279 children aged 0-15 months (dynamic cases and controls according to ongoing diarrhoea status)	Acute diarrhoea risk. With <6 hours as reference category, all later initiation times suggestively but non-significantly associated with diarrhoea. Pooling comparison into early vs. late initiators (before or after 24 hours) also gave a non-significant association	Five examination rounds in total, subjects could be cases or controls at each round depending on current diarrhoeal status. Larger sample size may have been necessary to observe significant associations. Suggestive progressively increased risk of acute diarrhoea with increasingly delayed breastfeeding initiation time.
Mullany, LC et al. [Ref 174]	2010	Southern Nepal, rural	Descriptive; prospective cohort study, hypothermia risk-analysis	Breastfeeding initiation time (< 24 hours, ≥ 24 hours)	23 240 neonatal infants	Neonatal hypothermia risk (<35°C). Adjusted prevalence rate 1.49 [1.37, 1.62]	Large sample size. Did not implement steps to account for reverse causality. Wide range of potentially confounding variables included in model. Temperature consistently measured for 28 days.

(D2) Breastfeeding initiation time - promotion outcomes

Source	Year	Location	Type of Study	Intervention/ Basis of Comparison	Sample Size	Relevant Outcomes	Comments, Strengths, Limitations
Kumar V et al. [Ref 165] [also appearing under table section C2 above]	2008	India, Uttar Pradesh state, rural	Interventional; cluster-randomised controlled trial	Community-based behaviour change management intervention. Two intervention groups, both receiving preventive package of interventions for essential newborn care, one also receiving hypothermia indicator. Control group received usual services	3762 singleton infants across 39 village administrative clusters	Breastfeeding within 1 hour of birth; 70.6%, 67.6% and 15.5%, in the essential newborn care intervention group, intervention plus hypothermia indicator group, and control group respectively. Both intervention groups vs. control arm; RR 4.37 [3.23-5.90], p<0.0001	Three arms of the trial similar in all measured characteristics at baseline survey. Total population of study area 104123. Intention to treat analysis undertaken. Analysis took into account clustered nature of data. Modification of many other essential newborn care behaviours also observed
Manandhar DS et al. [Ref 175]	2004	Nepal, hills, rural	Interventional; cluster-randomised controlled trial	Women's groups participatory community action cycle	6045 neonatal infants across 24 village administrative clusters	Breastfeeding within 1 hour of birth; 62% in the intervention clusters, 54% in the control clusters, aOR 1.40 [0.52-3.79]. Reported colostrum discarding; 29% in intervention clusters, 42% in control clusters, aOR 0.55 [0.27-1.10]	Associations suggestive but not statistically significant at 95% level for this sample size. Several other process indicator outcomes benefitted from intervention. Analyses adjusted for clustering
Haider R et al. [Ref 176] [also appearing under section B2 above]	2000	Bangladesh, urban	Interventional; cluster-randomised controlled trial	Community peer counsellling, including visits in third trimester of pregnancy and first five months after birth	726 mother-infant pairs across 40 clusters, women aged 16-35	Median breastfeeding initiation time; Intervention median 1 hour, control median 9 hours, p<0.0001. Proportion initiating within 1 hour; 64% in intervention group, 15% in control group	Further beneficial effects: proportion of infants receiving prelacteal feeds, exclusive breastfeeding at day 4 after birth. Large number (32%) of enrolled participants subsequently left study or excluded - no exploration of whether excluded participants differed in characteristics. Distribution of breastfeeding initiation times described as skewed, but frequencies of different initiation times not expressed in results

Lal S et al. [Ref 177] [abstract only]	1992	India, rural	Interventional; before-after study	Womens groups participatory health communication community intervention	300 mothers across 10 village units	Breastfeeding initiation "immediately after delivery; 60% after intervention, 23% before	Suffers from generic before-after difficulty of attributing changes to intervention alone and not external factors
Bradley JE and Meme J [Ref 151] [also appearing under section C2 above]	1992	Kenya, hospital-based: including city, provincial, religious	Interventional; before-after study	Government breastfeeding promotion programme; interviews with hospital workers and policy makers in 1982 and 1989, before and after programme	193 facilities (year 1982), 175 facilities (year 1989)	Reporting of breastfeeding within first hour after birth. 1982; 14% of health workers reported this practice, 1989; 61% of health workers	No details of nature of government promotion campaign. No indication of statistical significance or confidence intervals, however results appear to be dramatic.
Prasad B and Costello AMdL [Ref 155] [also appearing under section C2 above]	1995	India, Bihar state, hospital-based	Interventional; before-after study	10-day baby friendly training intervention for staff at district hospital, on initiation of breastfeeding and use of prelacteal feeds by mothers	172 mothers before intervention, 195 mothers immediately after, 101 six months later	Breast feeding within 24 hours of birth; 29% of control group, 84% of early follow-up group, 59% of late follow-up group	Prelacteal feeding reported to be more frequent in late follow-up group than early follow-up. Single explanations could affect mothers' behaviour, however continuing health worker education concluded to be necessary. No indication of statistical significance or confidence intervals
McDivitt JA et al. [Ref 180]	1993	Jordan, national	Interventional; before-after study	Mass media breastfeeding promotion campaign	800 women aged under 35 with child aged 2 or under (before), 777 women after	Initiated breastfeeding within 6 hours; 39.9% before, 54.3% after, $p<0.05$. "Knew about colostrum and first day breastfeeding"; 39.9% before, 71.9% after, $p<0.05$	Graphs show clear trend towards earlier breastfeeding initiation times without dichotomising data. The extent to which the media campaigns actually affected breastfeeding practices is however questionable; on a timeline the authors express key publicity events against changes in reporting of early initiation, and the media events do not coincide with any sudden improvements in practices, instead the improvement is gradual and begins before the campaign

APPENDIX B: MIRA MAKWANPUR SURVEILLANCE QUESTIONNAIRES – PHASE I

MIRA Makwanpur

मातृ तथा नवजात शिशु स्याहार कार्यक्रम

घरधुरी प्रश्नावली

Household questionnaire

१. घरधुरी परिचय संख्या
1 Household ID no.

गा.वि.स.नं. ☐☐ VDC no.

वडा नं. ☐ Ward no.

टोल ..... Tol

क्षेत्र नं. ☐ Sector no.

घरधुरी संख्या ☐☐☐ Household no.

अन्तर्वार्ता लिने व्यक्तिको नं. ☐☐ Interviewer no.

अन्तर्वार्ता लिइएको मिति कुन हो ? What is the interview date?

☐☐ गते day ☐☐ महिना month ☐☐ साल year

डाटा इन्ट्री गर्नेको परिचय संख्या ☐☐ Data Entry Person no.

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२. घरमूलीको नाम के हो ? 2 What is the name of the head of household? .....

३. घरमूली पुरुष वा महिला के हो ? 3 Is the head of household a man or a woman? ○ पुरुष man ○ महिला woman

४. उत्तर दिने व्यक्ति घरको मूली हो ? 4 Is the respondent the head of household? ○ हो yes ○ होईन no

(यदि उत्तर दिने व्यक्ति घरको मूली हो भने प्रश्न नं. ८ मा जानुहोस)
(If the respondent is the head of household, go to question no. 8)

उत्तर दिने व्यक्ति
The respondent

५. तपाईको नाम के हो ? 5 What is your name? .....

६. तपाईको उमेर कति हो ? 6 What is your age? ☐☐ वर्ष years

७. तपाईको घरमूलीसंग के नाता छ ? 7 What relation are you to the head of household? .....

धर्म र समुदाय
Religion and ethnicity

८. घरमूलीको धर्म कुन हो ? *(कुनै एकमा चिन्ह लगाउनुहोस)* 8 What is the religion of the head of household? *(Fill in one only)*

○ हिन्दु Hindu ○ बौद्ध Buddhist ○ मुसलमान Muslim ○ क्रिस्चियन Christian ○ अन्य Other .....

९. घरमूली कुन जात ÷ समुदायको हो ? *(कुनै एकमा चिन्ह लगाउनुहोस)* 9 What is the ethnic group/caste of the head of household *(Fill in one only)*

○ तामाङ Tamang ○ बाहुन Brahmin ○ क्षेत्री Chhetri ○ नेवार Newar ○ मगर Magar ○ प्रजा Praja

○ घर्ती Gharti ○ माझी Majhi ○ कामी Kaami ○ परियार Pariyar ○ सार्की Sarki ○ सन्यासी Sanyasi

○ दनुवार Danuwaar ○ गुरुङ Gurung ○ ठकुरी Thakuri ○ अन्य Other .....

परिवार संख्या
Family number

१०. तपाईको घरमा कतिजना बस्छन् ? 10 How many people live in your house? ☐☐ जना People

११. तपाइको घरमा कतिजना पन्ध्र बर्ष या सो भन्दा बढि उमेरका पुरुषहरु बस्दछन् ? 11 How many males aged 15 years and above live in your house? ☐☐ जना People

१२. तपाइको घरमा कतिजना पन्ध्र बर्ष भन्दा कम उमेरका पुरुषहरु बस्दछन् ? 12 How many males below the age of 15 years live in your house? ☐☐ जना People

१३. तपाइको घरमा कतिजना पन्ध्र बर्ष या सो भन्दा बढि उमेरका महिलाहरु बस्दछन् ? 13 How many females above the age of 15 years live in your house? ☐☐ जना People

१४. तपाइको घरमा कतिजना पन्ध्र बर्ष भन्दा मूनिका छोरी मान्छेहरु बस्दछन् ? 14 How many females below the age of 15 years live in your house? ☐☐ जना People

(प्रश्न नं. ११-१४ सम्मको उत्तर संख्या जोड्दा प्रश्न नं. १० को उत्तरसंग बराबर हुनुपर्दछ)
(The answers to questions 11-14 should add up to the same number as in question 10)

Household : 2

१५. अब, म तपाइको घरमा बस्ने सबै महिलाहरुको बारेमा *(प्रत्येक महिलाको लागि तलका प्रश्नहरु भन्नुहोस्)*
15 सोध्न जादैछु । Now I am going to ask you about all the women who live in your household. *(For each woman, fill in the details below)*

MWRA हो÷होइन Is / Is not MWRA *Data Team* ले लेख्ने Data Team will write	नाम Name	उमेर कति वर्ष र महिना भयो ? Age in months and years? जन्मेको महिना र साल Month and year of birth	घरमूलीसंगको नाता Relation to head of household	प्रायजसो यहि घरमा बस्छिन् Generally lives in the house *यदि बस्दिनन भने अर्को नाममा जानुहोस् If not, go to the next name*	*Is she likely to still be living there next year? If not, go to the next name* अको वर्ष पनि त्यहि बस्नु हुन्छ होला ? *यदि बस्दिनन भने अर्को नाममा जानुहोस्*	*Is she married? If not, go to the next name* बिवाहित हुन ? *यदि होइन भने अर्को नाममा जानुहोस्*	*Ask only to women who are living apart from their husbands* श्रीमानसंग	*If he does not live with you, does he come and go?* श्रीमानसंग अलग भएर बस्ने महिलालाई मात्र सोध्नुहोस् बस्नु हुन्न भने आउने जाने गर्नु हुन्छ ?	यदि MWRA हो र श्रीमान संग भेटघाट भइरहन्छ भने बक्समा चिन्ह लगाउनुहोस् ।
		वर्ष years महिना month		○ बस्छीन yes ○ बस्दिनन् no	○ बस्छीन yes ○ बस्दिनन् no	○ हो yes ○ होइन no	○ बस्छीन yes ○ बस्दिनन् no	○ आउनु हुन्छ yes ○ आउनु हुन्न no	If she is a MWRA and she spends time with her husband, put a tick in the box
		वर्ष महिना		○ बस्छीन ○ बस्दिनन्	○ बस्छीन ○ बस्दिनन्	○ हो ○ होइन	○ बस्छीन ○ बस्दिनन्	○ आउनु हुन्छ ○ आउनु हुन्न	
		वर्ष महिना		○ बस्छीन ○ बस्दिनन्	○ बस्छीन ○ बस्दिनन्	○ हो ○ होइन	○ बस्छीन ○ बस्दिनन्	○ आउनु हुन्छ ○ आउनु हुन्न	
		वर्ष महिना		○ बस्छीन ○ बस्दिनन्	○ बस्छीन ○ बस्दिनन्	○ हो ○ होइन	○ बस्छीन ○ बस्दिनन्	○ आउनु हुन्छ ○ आउनु हुन्न	
		वर्ष महिना		○ बस्छीन ○ बस्दिनन्	○ बस्छीन ○ बस्दिनन्	○ हो ○ होइन	○ बस्छीन ○ बस्दिनन्	○ आउनु हुन्छ ○ आउनु हुन्न	
		वर्ष महिना		○ बस्छीन ○ बस्दिनन्	○ बस्छीन ○ बस्दिनन्	○ हो ○ होइन	○ बस्छीन ○ बस्दिनन्	○ आउनु हुन्छ ○ आउनु हुन्न	
		वर्ष महिना		○ बस्छीन ○ बस्दिनन्	○ बस्छीन ○ बस्दिनन्	○ हो ○ होइन	○ बस्छीन ○ बस्दिनन्	○ आउनु हुन्छ ○ आउनु हुन्न	
		वर्ष महिना		○ बस्छीन ○ बस्दिनन्	○ बस्छीन ○ बस्दिनन्	○ हो ○ होइन	○ बस्छीन ○ बस्दिनन्	○ आउनु हुन्छ ○ आउनु हुन्न	
		वर्ष महिना		○ बस्छीन ○ बस्दिनन्	○ बस्छीन ○ बस्दिनन्	○ हो ○ होइन	○ बस्छीन ○ बस्दिनन्	○ आउनु हुन्छ ○ आउनु हुन्न	

Household : 3

घर
House

१६. यो घर तपाईको आफ्नो हो ? ○ हो ○ होइन
16 Is this house your own house? yes no
(हो भने प्रश्न नं. १८ मा जानुहोस) *(If yes, go to question no. 18)*

१७. घरमा बसेबापत पैसा तिर्नु हुन्छ वा अरु केही काम गरि दिनु हुन्छ ?
17 For rental of the house, do you have to pay money or do some work?
○ भाडा स्वरुप पैसा तिर्ने ○ भाडा स्वरुप श्रम दिने ○ अन्य .....
Pay rent in money Pay rent in kind Other

१८. घर हेरेर घर केले बनेको छ लेख्नुहोस
18 Looking at the house, write down what it is made of
○ सिमेन्ट र ईटा ○ माटो र ईटा ○ माटो र ढुंगा ○ फल्याक ○ स्याउला ○ खर
Cement and brick Mud and brick Mud and stone Planks Brushwood Thatch
○ अन्य .....
Other

१९. तपाईको घरमा कति तल्लाहरु छन् ? ☐ तल्ला
19 How many storeys does your house have? storeys

घर सम्पति
Household possessions

२०. तपाईको घरमा कुनकुन सामानहरु छन् ?
20 Which things do you have in your house?
(घरमा भएका सामानहरु सबैमा चिन्ह लगाउनु होस)
(Tick all the things that there are in the house)
☐ बस वा ट्रक ☐ मोटरसाइकल ☐ टि. भी. ☐ मोटर ट्र्याक्टर ☐ फ्रिज ☐ हाते ट्र्याक्टर
Bus or truck Motorcycle TV Motor tractor Fridge Hand tractor
☐ सिलाई मेशीन ☐ क्यासेट प्लेयर ☐ पँखा ☐ रेडियो ☐ क्यामेरा ☐ साइकल
Sewing machine Cassette player Fan Radio Camera Bicycle
☐ भित्ते घडी ☐ इस्ट्री ☐ माथीका कुनै पनि बस्तुहरु छैनन्
Wall clock Iron None of the above things

२१. तपाईले घरमा गाईबस्तुहरु कति वटा पाल्नु भएको छ ?
21 How many livestock animals do you have in your household?
☐☐ गोरु ☐☐ गाई ☐☐ राँगा ☐☐ भैसि ☐☐ खसी वा बाखा ☐☐ सुँगुर वा बगुंर ☐☐ भेंडा
Bull Cow Buffalo Buffalina Goat Pig Sheep
☐ माथिको मध्ये कुनै पनि छैन
None of the above livestock

जमिन
Livelihood

२२. तपाईको घरको मुख्य पेशा के हो ? *(मुख्य काम लेख्नुहोस)*
22 What is the major occupation of the household? *(Write the major occupation)*
○ कृषि ○ ज्यालादारी ○ तलबी काम वा सरकारी काम ○ सानोतिनो व्यवसाय
Agriculture Waged labour Salaried or government work Small business

२३. तपाईले एक भन्दा बढी काम गर्नुहुन्छ भने सहायक वा दोश्रो काम के हो ?
23 If you do more than one type of work, what is your secondary type of work?
(यदि कुनै साहायक काम छैन भने केहि गर्दिनमा चिन्ह लगाउनुहोस)
(If there is no secondary work, tick no work)
○ कृषि ○ ज्यालादारी ○ तलबी काम वा सरकारी काम ○ सानोतिनो व्यवसाय
Agriculture Waged labour Salaried or government work Small business
○ केहि गर्दिन
No work

२४. यो घरले खेति लगाउने गरेको छ ?
24 Do you do any cultivation in your household?
○ खेति लगाउने गरेको छ
Yes
○ खेति लगाउने गरेको छैन
No
(यदि खेति लगाउने गरेको छैन भने प्रश्न नं. २७ मा जानुहोस)
(If no, go to question no. 27)

२५. खेति लगाउने जमिन मध्ये घरको आफ्नै कति हो ? *(यदि छैन भने शुन्य (०) लेख्नुहोस)*
25 Among the area you cultivate, how much is owned by the household? *(If none, write "0")*
खेत ☐☐ कट्ठा *वा* ☐☐ बिगाहा *वा* ☐☐ रोपनी
Khet kattha *or* bigha *or* ropani
बारी ☐☐ कट्ठा *वा* ☐☐ बिगाहा *वा* ☐☐ रोपनी
Bari kattha *or* bigha *or* ropani

२६. खेति लगाउने जमिन मध्ये अर्काको कति हो ? *(यदि छैन भने शुन्य (०) लेख्नुहोस)*
26
खेत ☐☐ कट्ठा *वा* ☐☐ बिगाहा *वा* ☐☐ रोपनी
Khet kattha *or* bigha *or* ropani
बारी ☐☐ कट्ठा *वा* ☐☐ बिगाहा *वा* ☐☐ रोपनी
Bari kattha *or* bigha *or* ropani

Household : 4

आम्दानी र खर्च
Income and expenditure

२७. 27 घरको आम्दानीले वर्षमा कति महिना खान पुग्छ ? For how many months of the year does the household have enough food? ☐☐ महिना months

(यदि १२ महिना सम्मलाई पुग्छ भने प्रश्न नं. २९ मा जानुहोस)
(If there is enough for 12 months, go to question 29)

२८. 28 बांकी महिना कसरी गुजारा गर्नु हुन्छ ? What do you do to cope during the months in which there is not enough?
.....

२९. 29 तपाईहरुले गएको बर्ष तलका स्वास्थ्य सेवामा अन्दाजी कति रकम खर्च गर्नु भयो ? Approximately how much did the household spend on the following health services last year?
(यदि कुनैमा पनि खर्च भएन भने शुन्य (०) लेख्नुहोस)
(If nothing at all, write "0")

सरकारी स्वास्थ्य सेवा (अस्पताल, प्र.स्वा.के., स्वा.के., उप स्वा.के.) Government health services (hospital, PHC, HP, SHP)	रु. Rs ☐☐☐☐☐☐
निजी स्वास्थ्य सेवा Private health services	रु. Rs ☐☐☐☐☐☐
औषधी पसल Medicine shop	रु. Rs ☐☐☐☐☐☐
धामी झाँक्री Dhaami jhankri	रु. Rs ☐☐☐☐☐☐

अपांग
Disability

३०. 30 तपाईको घरमा २० वर्ष भन्दा मुनिका कुनै अपांग व्यक्ति हुनु हुन्छ ? Does anyone under the age of 20 in your household have a disability?

○ छ Yes ○ छैन No

(यदि छैन भने अन्तर्वार्ता रोक्नुहोस)
(If not, stop the interview)

(कस्तो किसिमको अपांग हो प्रत्येक व्यक्तिको बारेमा लेख्नुहोस)
(Write the type of disability for each person)

नाम Name	**अपांगको किसिम** Type of disability
पहिलो व्यक्ति ..... First person	.....
दोश्रो व्यक्ति ..... Second person	.....
तेश्रो व्यक्ति ..... Third person	.....

मिरा मकवानपुर

मातृ तथा नवजात शिशु स्याहार कार्यक्रम

MWRA प्रश्नावली

MWRA Questionnaire

घरधुरी परिचय

Household ID no.

गा. वि. स. नं. ☐☐ VDC no.

वडा नं. ☐ Ward no.

टोल ..... Tol

क्षेत्र नम्बर ☐ Sector number

घरधुरी संख्या ☐☐☐ Household no.

अन्तर्वार्ता लिएको मिति Interview date

☐☐ गते day ☐☐ महिना month ☐☐ साल year

अन्तर्वार्ता लिनेको परिचय संख्या ☐☐ Interviewer no.

MWRA को नाम ..... MWRA name

MWRA को परिचय संख्या ☐☐ ☐☐ ☐☐☐ ☐ MWRA ID no.

१ व्यक्तिगत बिवरण 1 Personal details

तौल ☐☐.☐ Kg Weight

उचाई ☐☐☐.☐ cm Height

MUAC ☐☐.☐ cm

उमेर र विवाह

Age and marriage

१.१ तपाई आफ्नो गतको जन्म दिनमा कति बर्ष पुरा पुग्नु भयो ? 1.1 How many complete years old were you on your last birthday? ☐☐ वर्ष Years

१.२ तपाई कुन साल कुन महिनामा जन्मिनु भएको हो ? 1.2 In what year and which month were you born? ☐☐ महिना Month ☐☐ साल Year

१.३ तपाईको विवाह हुँदा तपाई कति बर्षको हुनु हुन्थ्यो ? 1.3 How old were you when you got married? ☐☐ वर्ष Years

१.४ तपाई आफ्नो श्रीमानसंग सगै बस्न शुरु गर्दा कति बर्षको हुनु हुन्थ्यो ? 1.4 How old were you when you first started living with your husband? ☐☐ वर्ष Years

शिक्षा

Education

१.५ तपाई कहिल्यै बिद्यालय जानु भएको छ ? 1.5 Did you ever go to school? ○ छ Yes ○ छैन No *(यदि छैन भने प्रश्न नं. १.७ मा जानुहोस्)* *(If no, go to question no. 1.7)*

१.६ कति कक्षा सम्मको पढाई पुरा गर्नु भएको छ ? 1.6 Up to which class did you attend? ☐☐ कक्षा Class

१.७ तपाई यो बाक्य पढ्न सक्नु हुन्छ ? 1.7 Can you read this passage? *(पढ्नको लागि एउटा बाक्य देखाउनु होस्)* *(Show her a passage to read)*

○ सजिलै पढ्न सक्ने Reads with ease ○ गाह्रो संग पढ्न सक्ने Reads with difficulty ○ पढ्न नसक्ने Cannot read

काम

Education

१.८ घर भित्रको काम बाहेक अन्य केहि काम गर्नु हुन्छ ? 1.8 Apart from housework, do you do any other work? ○ गर्छु Yes ○ गर्दिन No *(यदि गर्दिन भने प्रश्न नं. १.१०मा जानुहोस्)* *(If no, go to question no. 1.10)*

१.९ तपाईको अन्य काम के हो ? 1.9 What is your other work?

○ कृषि Agriculture ○ ज्यालादारी Waged labour

○ तलबी काम वा सरकारी काम Salaried or governemment work ○ सानोतिनो व्यवसाय Small business

परिवार नियोजन

Family planning

१.१० हाल तपाई वा तपाईको श्रीमानले परिवार नियोजनको कुनै साधन प्रयोग गर्दै हुनुहुन्छ ? 1.10 Do you or your husband make useof any sort of family planning? ○ छ Yes ○ छैन No *(यदि छैन भने प्रश्न नं. १.१२ मा जानुहोस्)* *(If no, go to question no. 1.12)*

१.११ कुन साधन÷तरीका अपनाउनु भएको छ ? 1.11 What method do you use?

स्थायी Permanent ○ मिनील्याप Minilap ○ भ्यासेक्टोमी Vasectomy ○ अन्य ..... Other

अस्थायी Temporary ○ डिपो Depo ○ नरप्लान्ट Norplant ○ पिल्स÷खाने चक्की Pill ○ आई.यु.डी. IUD

○ कन्डम Condom ○ अन्य ..... Other

१.१२ तपाई कहिल्यै गर्भवति हुनु भएको थियो ? 1.12 Have you ever been pregnant? ○ थियो Yes ○ थिएन No *(यदि थिएन भने अन्तर्वार्ता रोक्नुहोस्)* *(If no, stop the interview)*

२ प्रसुतीपूर्वको हेरचाह
2 Antenatal care

(यो पेजका प्रश्नहरु पछिल्लो गर्भावस्थाको लागि सोध्नुहोस)
(Ask the questions on this page about the last pregnancy)

२.१ पछिल्लो गर्भावस्थामा तपाई जचाउनु जानु भयो ? ○ गएँ Yes ○ गइन No *(यदि गइन भने प्रश्न नं. २.८ मा जानुहोस)*
2.1 In your last pregnancy, did you go for a check-up? *If no, go to question no. 2.8)*

२.२ गर्भावस्थामा जचाउन कहाँ जानु भयो ?
2.2 Where did you go for the pregnancy check-up?

☐ अस्पताल Hospital ☐ प्रा. स्वा. के. PHC ☐ स्वा. चौ. HP
☐ उप-स्वा.चौ. SHP ☐ गाउँघर क्लिनिक Mobile clinic ☐ परिवार नियोजन क्लिनिक Family planning clinic
☐ प्राइभेट क्लिनिक Private clinic ☐ अन्य ..... Other

२.३ को संग जचाउनु भयो ?
2.3 Who did you see for the check-up?

☐ डाक्टर Doctor ☐ नर्स Nurse
☐ अ. न. मी. ANM ☐ हे.अ.÷सि.अ.हे.ब.÷अ.हे.ब.÷सि.एम.ए. HA/SAHW/AHW/CMA
☐ तालीम प्राप्त सुडेनी Trained TBA ☐ तालीम नपाएको सुडेनी Untrained TBA
☐ मात् शिशु स्वास्थ्य कार्यकर्ता MCHW ☐ ग्रामिण स्वास्थ्य कार्यकर्ता VHW
☐ महिला स्वास्थ्य स्वयम् सेवीका FCHV ☐ थाहा छैन Don't know
☐ अन्य ..... Other

२.४ कति महिनाको गर्भवती हुँदा पहिलो पटक जचाउन जानुभयो ? ☐☐ महिना
2.4 How many months pregnant were you when you first went for a check-up? Months

२.५ कतिपटक जचाउनु भयो ? ☐☐ पटक
2.5 How many times did you go? Times

२.६ पहिलो पटक जचाउदा समस्या भएर जचाउनु भएको हो कि सबैकुरा ठिक छ कि छैन भनेर जान्नको लागी मात्र जचाउन जानु भएको हो ?
2.6 The first time that you went for a check-up, was it because there was a problem, or just to check that everything was all right?

○ समस्या भएर There was a problem ○ समस्या नभई There was no problem *(यदि समस्या नभएमा प्रश्न नं. २.८ मा जानुहोस)*
(If there was no problem, go to question no. 2.8)

२.७ के समस्या थियो ? *(एउटा मात्र विशेष समस्यामा चिन्ह लगाउनुहोस)* *(Tick only one problem)*
2.7 What was the problem?

○ योनीबाट रगत बगेको थियो Vaginal bleeding
○ पेट दुख्ने Stomach pain
○ टाउको दुख्ने, कमजोरी, मुर्छा पर्ने, रिङ्गटा लाग्ने Headache, weakness, faints, dizziness
○ हात, खुट्टा,मुख सुन्नीने Hand, leg or face swelling
○ अन्य ..... Other
○ बान्ता हुने,खाना खान मन नलाग्ने Nausea, off food
○ योनी बाट पानी बग्ने Vaginal discharge
○ पहेलो हुने Jaundice
○ बच्चाको अबस्था ठिक नभएर Baby's condition abnormal
○ पछिल्लो गर्भ अबस्थाका समस्याको कारण Problem in the previous pregnancy

---

टि. टि.
TT

२.८ तपाईले कहिल्यै टि. टि. सूई लिनु भएको छ ? ○ छ Yes ○ छैन No ○ थाहा छैन Don't know
2.8 Did you ever have a TT injection? *(यदि छैन वा थाहा छैन भने प्रश्न नं. २.१० मा जानुहोस)*
(If no, go to question no. 2.10)

२.९ पछिल्लो गर्भावस्थामा कति पटक लगाउनु भयो ? ☐ टि. टि. TT
2.9 How many times did you have it in the last pregnancy?

औषधी
TT

२.१० पछिल्लो गर्भावस्थामा भिटामीन र आइरन चक्कि खानु भयो ? ○ खाएँ Yes ○ खाईन No ○ थाहा छैन Don't know
2.10 In the last pregnancy, did you take vitamin and iron tablets? *(यदि खाइन वा थाहा छैन भने प्रश्न नं. ३.१ जानुहोस)*
(If no, go to question no. 3.1)

२.११ कति महिना सम्म खानु भयो ? ☐☐ हप्ता Weeks वा or ☐☐ महिना Months
2.11 How many months did you take them for?

३ पछिल्लो गर्भावस्थाका समस्याहरु
3 Problems in the last pregnancy

(यो पेजका प्रश्नहरु पछिल्लो गर्भावस्थाको लागि सोध्नुहोस)
(Ask the questions on this page about the last pregnancy)

१. रगत बग्ने समस्या
1 Problems in the last pregnancy

३.१ कहिल्यै रगत बग्ने समस्या भयो ? ○ भयो ○ भएन *(यदि भएन भने प्रश्न नं. ३.५ मा जानुहोस)*
3.1 Did you have vaginal bleeding? Yes No *(If no, go to question no. 3.5)*

३.२ यो भएको कहिले हो ? ○ ब्यथा लाग्नु भन्दा अगाडी ○ बच्चा जन्मिसकेपछि
3.2 When did it happen? Before the baby was born After the baby was born
○ बच्चा जन्मनु भन्दा अगाडी र बच्चा जन्मि सकेपछि
Before and after the baby was born

३.३ के रगतले तपाईको कपडा, ओछ्यान र भुँई भिज्यो ? ○ भिज्यो ○ भिजेन
3.3 Did the bleeding soak your clothes, the mattress and the floor? Yes No

३.४ रगत बग्दा पेट पनि दुखेको थियो ? ○ थियो ○ थिएन
3.4 During the bleeding, did you have stomach pain? Yes No

२. ब्लड प्रेसर
2 Blood pressure

३.५ के तपाई बेहोस÷काम्ने हुनु भयो ? ○ भएँ ○ भइन
3.5 Did you have any fits/convulsions? Yes No

३.६ के तपाईको अनुहार सुन्निएको थियो ? ○ थियो ○ थिएन
3.6 Was your face swollen? Yes No

३.७ के तपाईको खुट्टा सुन्निएको थियो ? ○ थियो ○ थिएन
3.7 Were your legs swollen? Yes No

३.८ के आँखा तिर्मिराउने भएको थियो ? ○ थियो ○ थिएन
3.8 Did you have blurred vision? Yes No

३.९ तपाईले ब्लड प्रेसर नाप्नु भएको थियो ? ○ थियो ○ थिएन ○ थाहा छैन
3.9 Did you have your blood pressure measured? Yes No Don't know
(यदि थिएन वा थाहा छैन भने प्रश्न नं. ३.११ मा जानुहोस)
(If no or don't know, go to question no. 3.11)

३.१० तपाईलाई थाहा छ तपाईको ब्लड प्रेसर कस्तो थियो ? ○ कम ○ ठिकै ○ बढि ○ थाहा छैन
3.10 Do you know how your blood pressure was? Low Normal High Don't know

३. ज्वरो
3 Fever

३.११ तपाईलाई २४ घण्टा भन्दा बढि लगातार धेरै ज्वरो आएको थियो ? ○ आयो ○ आएन
3.11 Did you have a fever continuously for over 24 hours? Yes No
(यदि आएन भने प्रश्न नं. ३.१४ मा जानुहोस)
(If no, go to question no. 3.14)

३.१२ ज्वरो कहिले आएको थियो ? ○ बच्चा जन्मनु भन्दा अगाडी ○ बच्चा जन्मिसकेपछि
3.12 When did you have the fever? Before the baby was born After the baby was born
○ बच्चा जन्मनु भन्दा अगाडी र बच्चा जन्मिसकेपछि
Before and after the baby was born

३.१३ कति दिन सम्म आयो ? ☐☐ दिन वा ☐☐ महिना
3.13 How long did the fever last? Days or Months

४. गन्हाउने पानी
4 Vaginal discharge

३.१४ चौबिस घण्टा भन्दा बढि गन्हाउने पानी बग्यो ? ○ बग्यो ○ बगेन *(यदि बगेन भने प्रश्न नं. ३.१७ मा जानुहोस)*
3.14 Did you have a vaginal discharge for over 24 hours? Yes No *(If no, go to question no. 3.17)*

३.१५ गन्हाउने पानी कहिले बगेको थियो ? ○ बच्चा जन्मनु भन्दा अगाडी ○ बच्चा जन्मिसकेपछि
3.15 When did you have the discharge? Before the baby was born After the baby was born
○ बच्चा जन्मनु भन्दा अगाडी र बच्चा जन्मिसकेपछि
Before and after the baby was born

३.१६ कति दिन सम्म बग्यो ? ☐☐ दिन वा ☐☐ महिना
3.16 How long did the discharge last? Days or Months

५. रक्तअल्पता
5 Anaemia

३.१७ घरको काम गर्दा तपाईलाई बढि स्याँ स्याँ भएको थियो ? ○ थियो ○ थिएन
3.17 Were you breathless when you did the housework? Yes No

३.१८ के तपाई सेतो *(रगतको कमि)* हुनु भएको थियो ? ○ थियो ○ थिएन ○ थाहा छैन
3.18 Did you look pale (bloodless)? Yes No Don't know

३.१९ तपाईलाई रातको समयमा हेर्नलाई कठिनाई भएको थियो ? ○ थियो ○ थिएन ○ थाहा छैन
3.19 Did you have trouble seeing at night? Yes No Don't know

४ स्वास्थ्य उपचार Treatment
4

*(पछिल्लो गर्भावस्था मध्ये कुनै पनि समस्या भएमा **पहिलो** समस्याको लागि तलका प्रश्नहरु सोध्नुहोस)*
(If there were any problems during the last pregnancy, ask the questions below about the first of these)

(यदि बिरामी नभएमा प्रश्न नं. ५.१ मा जानुहोस)
(If she had no illness, go to question 5.1)

धामी
Dhaami

४.१ तपाई वा तपाईको परिवारले, विरामी उपचार गर्नलाई धामी कहाँ जानु भयो ? ○ गएँ Yes ○ गइन No
4.1 Did you or your family go to the Dhaami for any treatment when you were ill?

स्वास्थ्य संस्था
Health service

४.२ तपाई वा तपाईको परिवारले, विरामी उपचार गर्नलाई स्वास्थ्य संस्थामा जानु भयो ? ○ गएँ Yes ○ गइन No
4.2 Did you go to the health service for any treatment?

(यदि गएन भने प्रश्न नं. ४.७ जानुहोस)
(If no, go to question 4.7)

४.३ कहाँ जचाउन जानु भएको थियो ?
4.3 Where did you go for the consultation?

☐ अस्पताल Hospital ☐ प्रा. स्वा. के. Primary Health Centre ☐ स्वा. चौ. Health Post
☐ उप-स्वा.चौ. Sub Health Post ☐ गाउँघर क्लिनिक Mobile clinic ☐ परिवार नियोजन क्लिनिक Family Planning clinic
☐ प्राइभेट क्लिनिक Private clinic ☐ औषधी पसल Medicine shop ☐ अन्य ..... Other

४.४ तपाईले को संग उपचार गराउनु भयो ?
4.4 Who did you get treatment from?

☐ डाक्टर Doctor ☐ नर्स Nurse ☐ अ. न. मी. ANM
☐ हे.अ.÷सि.अ.हे.ब.÷अ.हे.ब.÷सि.एम.ए. HA/SAHW/AHW/CMA ☐ तालीम प्राप्त सुडेनी Trained TBA ☐ तालीम नपाएको सुडेनी Untrained TBA
☐ मात् शिशु स्वास्थ्य कार्यकर्ता MCHW ☐ ग्रामिण स्वास्थ्य कार्यकर्ता VHW ☐ महिला स्वास्थ्य स्वयम् सेवीका FCHV
☐ औषधी पसले Medicine shopkeeper ☐ थाहा छैन Don't know ☐ अन्य ..... Other

४.५ कसरी त्यहाँ (पुगाइयो) पुग्नु भयो ?
4.5 How did you get there?

☐ हिंडेर Walked ☐ बोकेर Carried ☐ गाडामा Cart ☐ एम्बुलेन्स Ambulance ☐ गाडी÷टेम्पो÷बस÷रिक्सा Car/tempo/bus/rickshaw

४.६ बिरामी भएको कति समयपछि तपाई त्यहां पुग्नु भयो ? ☐☐ घण्टा पछि Hours वा or ☐☐ दिन पछि Days after
4.6 How long after you became ill did you arrive there?

उपचार
Treatment

४.७ तपाई बिरामी हुंदा कुनै प्रकारको उपचार लिनु भयो ? ○ लिए Yes ○ लिइन No *(यदि लिएन भने प्रश्न नं. ५.१ मा जानुहोस)*
4.7 When you were ill did you take any sort of medi cine? *(If no, go to question no. 5.1)*

४.८ के लिनु भयो ? ○ औषधि Allopathic medicine ○ घरेलु औषधि उपचार Traditional medicine ○ औषधि र घरेलु औषधि उपचार Allopathic and traditional medicine
4.8 What did you take?

○ अन्य Other .....

४.९ बिरामी भएको कति समय पछि उपचार पाउनु भयो ? ☐☐ घण्टा पछि Hours after वा or ☐☐ दिन पछि Days after वा or ☐☐ हप्ता पछि Weeks after
4.9 How long after you became ill did you take the medicine?

५ पछिल्लो गर्भावस्थाहरु
5 Previous pregnancies

गर्भ खेर गएको
Miscarriage

५.१ तपाईको सात महीना भन्दा अगाडीको कुनै गर्भ खेर गएको थियो ? ○ थियो Yes ○ थिएन No
5.1 Have you ever had a miscarriage before 7 months of pregnancy?

(यदि थिएन भने प्रश्न नं. ५.३ मा जानुहोस)
(If no, go to question no. 5.3)

५.२ कती पटक खेर गयो ? ☐☐ पटक Times
5.2 How many times have you had a miscarriage?

मरेको बच्चा
Stillbirth

५.३ तपाईले जन्मनु भन्दा अगाडि नै मरेको बच्चा जन्माउनु भएको छ ? ○ छ Yes ○ छैन No
5.3 Have you ever given birth to a baby who had died before being born?

(यदि छैन भने प्रश्न नं. ५.५ मा जानुहोस)
(If no, go to question no. 5.5)

५.४ यस्तो कति पटक भयो ? ☐☐ पटक Times
5.4 How many times has this happened?

जिबित बच्चा
Living baby

५.५ तपाईले जिबित बच्चा पाउनु भएको छ ? ○ छ Yes ○ छैन No
5.5 Have you ever given birth to a living baby?

(यदि जन्माएको छैन भने र प्रश्न नं. ५.३ मा पनि छैन भने अन्तर्वार्ता रोक्नुहोस)
(If no, and if the answer to question no. 5.3 is also no, stop the interview)

६ सुत्केरी Maternity

6

(यदि जिउंदो जन्मेको बच्चा छ भने तलका प्रश्नहरु पछिल्लो जिउंदो बच्चाको लागि सोध्नुहोस)
(If she has had a living baby, ask the questions below about the last living baby she has had)
(यदि जिउंदो जन्मेको बच्चा नभए तलका प्रश्नहरु पछिल्लो जन्मनु भन्दा अगाडि नै मरेको बच्चाको लागि सोध्नुहोस)
(If she has not had a living baby, ask the questions below about the last stillbirth she has had)

६.१ तपाईलाई कति समय सम्म व्यथा लाग्यो ? ☐☐ घण्टा सम्म वा ☐☐ दिन सम्म
6.1 How long did your labour last? Hours or Days

६.२ बच्चा जन्मनु भन्दा २४ घण्टा अगाडी नै पानी फुटेको थियो ? ○ थियो ○ थिएन ○ थाहा छैन
6.2 Did your waters break more than 24 hours before the baby wwas born? Yes No Don't know

६.३ के पानी धेरै गन्हाउने थियो ? ○ थियो ○ थिएन ○ थाहा छैन
6.3 Were the waters very foul? Yes No Don't know

६.४ पानी कस्तो रंगको थियो ? ○ सफा ○ खैरो ○ अन्य ○ थाहा छैन
6.4 What colour were the waters? Clear Brown Other Don't know

६.५ सबभन्दा पहिला बच्चाको कुन अंग बाहिर निस्कियो ?
6.5 Which part of the baby came out first?
○ टाउको Head ○ उल्टो Breech ○ पाखुरा वा खुट्टा Arm or leg ○ नाइटोको भाग Umbilical cord ○ थाहा छैन Don't know

६.६ बच्चा कसरी बाहिर निस्कियो÷निकालियो ?
6.6 How did the baby come out?
○ आफै On its own ○ हातले With manual aid ○ औजारको प्रयोग गरेर With forceps ○ पेट चिरेर By operation

६.७ ब्यथा लाग्नु भन्दा अगाडि अथवा ब्यथा लाग्दा कुनै औषधि प्रयोग गरिएको थियो ? ○ थियो ○ थिएन
6.7 Did you take any sort of allopathic medicine before or during the labour? Yes No

६.८ ब्यथा लाग्दा अथवा ब्यथा लाग्नु भन्दा अगाडी कुनै घरेलु औषधिहरु प्रयोग गरिएको थियो ? ○ थियो ○ थिएन
6.8 Did you take any sort of traditional remedy before or during the labour? Yes No

७ नवजात शिशु स्याहार

7 Newborn care

(यदि जिउंदो जन्मेको बच्चा नभए तलका प्रश्नहरु पछिल्लो जन्मनु भन्दा अगाडि नै मरेको बच्चाको लागि सोध्नुहोस)
(If she has not had a living baby, ask the questions below about the last stillbirth)

७.१ तपाईले बच्चा कहाँ जन्माउनु भयो?
7.1 Where was your baby born?
○ घरमा House ○ गोठमा Shed ○ खेत÷बारी÷जंगल Fields/woods ○ आंगन, पिडि, छत Area around the house ○ अस्पताल Hospital
○ प्राइभेट क्लिनिक Private clinic ○ अन्य Other .....

७.२ सुत्केरी कोठालाई आगो÷स्टोभ अथवा अन्य साधनले कहिले तताइएको थियो ?
7.2 Was there a fire, stove or other form of heating in the delivery room?
○ बच्चा जन्मनु भन्दा अगाडी Before the baby was born ○ बच्चा जन्मि सके पछि After the baby was born ○ बच्चा जन्मनु भन्दा अगाडी र पछि Before and after the baby was born ○ थिएन

७.३ सुत्केरी हुंदा कस्ले सहयोग गऱ्यो ?
7.3 Who helped you with the delivery?
☐ डाक्टर Doctor ☐ नर्स Nurse ☐ अ. न. मी. ANM
☐ हे.अ.÷सि.अ.हे.ब.÷अ.हे.ब.÷सि.एम.ए. HA/SAHW/AHW/CMA ☐ तालीम प्राप्त सुडेनी Trained TBA ☐ तालीम नपाएको सुडेनी Untrained TBA
☐ मातृ शिशु स्वास्थ्य कार्यकर्ता MCHW ☐ ग्रामिण स्वास्थ्य कार्यकर्ता VHW ☐ महिला स्वास्थ्य स्वयम् सेवीका FCHV
☐ सासु Mother-in-law ☐ परिवारका सदस्य Family member ☐ छिमेकी÷साथी Neighbour/friend
☐ आफै (कोही पनि नभएको) Alone (nobody helped) ☐ अन्य Other .....

(यदि कसैले मद्दत गरेको थिएन भने प्रश्न नं. ७.५ मा जानुहोस)
(If nobody helped, go to question no. 7.5)

७.४ सहयोग गर्ने मानिसले हात धोएको थियो ? ○ थियो ○ थिएन ○ थाहा छैन
7.4 Did the person who helped wash her hands? Yes No Don't know

७.५ यो के हो ? चिन्नु हुन्छ ? *(सुत्केरी सामग्री देखाउने)* ○ चिन्छु ○ चिन्दिन *(यदि चिन्दैन भने प्रश्न नं. ७.७ मा जानुहोस)*
7.5 Do you know what this is? *(Show a Clean Home Delivery Kit)* Yes No *(If she does not know, go to question no. 7.7)*

७.६ सुत्केरी सामाग्री प्रयोग गर्नु भयो ? ○ गरे ○ गरिन
7.6 Did you use a Clean Home Delivery Kit? Yes No

७.७ बच्चा जन्मेको कति समय पछि साल झऱ्यो ?
7.7 How long after the baby was born was the placenta delivered?
○ ३० मिनेट भित्र Within 30 minutes ○ ३० मिनेट देखि १ घण्टा सम्म 30 minutes to 1 hour ○ १ घण्टा देखि ६ घण्टा सम्म 1 hour to 6 hours
○ ६ घण्टा देखि १२ घण्टा सम्म 6 hours to 12 hours ○ १२ घण्टा देखि २४ घण्टा सम्म 12 hours to 24 hours
○ २४ घण्टा भन्दा बढी More than 24 hours

७.८ के साल एकैचोटि निस्कियो कि टुक्रा टुक्रा भएर निस्कियो ? ○ जम्मै ○ टुक्रा टुक्रा ○ थाहा छैन
7.8 Did the placenta come out in one piece or bit by bit? Intact In pieces Don't know

(यदि जन्मनु अगाडि नै मरेको बच्चा भए अन्तर्वार्ता रोक्नुहोस साथै बच्चा जन्मेर केहि छिन पछि नै मरेको भए प्रश्न नं. ९.१ मा जानुहोस)
(If you are asking about a stillbirth, stop the interview. If the baby died within a few minutes of birth, go to question no. 9.1)

नवजात शिशु स्याहार ..... Newborn care...

७.९ नाल के ले काट्नु भयो ?
7.9 What was the cord cut with?

○ उमालेको पत्तीले Boiled blade ○ नउमालेको पत्तीले Unboiled blade ○ चक्कु÷छुरीले÷कैंचि Knife ○ हसिया÷खुर्पा Sickle/woodknife ○ बाँसले bamboo stick

○ थाहा छैन Don't know ○ अन्य Other .....

७.१० नाभी काटि सके पछि के लगाउनु भयो?
7.10 What was put on the cord after it was cut?

○ तेल Oil ○ बेसार Turmeric ○ नधोएको कपडा वा कपास Unwashed cloth ○ धोएको कपडा वा कपास Washed cloth

○ औषधि, डेटोल Medicine/Dettol ○ पाउडर Powder ○ माटो Mud ○ केहि नराखेको Nothing

○ थाहा छैन Don't know ○ अन्य Other .....

७.११ बच्चालाई कस्तो कपडाले बेरिएको थियो? ○ नयां कपडा New cloth ○ पुरानो कपडा Old cloth ○ थाहा छैन Don't know
7.11 What sort of cloth was the baby wrapped in?

७.१२ बच्चालाई बेर्ने कपडा धोएको थियो? ○ थियो Yes ○ थिएन No ○ थाहा छैन Don't know
7.12 Had the cloth been washed?

७.१३ बच्चा जन्मिएको कति बेर पछि बच्चालाई कपडाले बेरिएको थियो? ☐☐ मिनेट पछि Minutes after वा or ☐☐ घण्टा पछि Hours after
7.13 How long after birth was the baby wrapped up?

७.१४ जन्मिएको कति समय पछि बच्चालाई नुहाउनु भयो ? ☐☐ मिनेट पछि Minutes after वा or ☐☐ घण्टा पछि Hours after वा or ☐☐ दिन पछि Days after
7.14 How long after birth was the baby bathed?

७.१५ बच्चालाई पहिलो पटक के खान दिइयो?
7.15 What was the first food given to the baby?

○ आमाको दुध Breastmilk ○ अरु आमाको दुध Other woman's milk ○ गाई÷भैसिको दुध Cow/buffalo milk ○ ल्याक्टोजेन Formula ○ दुध खाना Milk food

○ घ्यु Ghee ○ घ्यु र चिनी Ghee and sugar ○ घ्यु र मह Ghee and honey ○ चिनी Sugar ○ मह Honey

○ तेल Oil ○ थाहा छैन Don't know ○ अन्य Other .....

७.१६ बच्चा जन्मिसकेपछि माइती जानुभयो ? ○ गएं Yes ○ गइन No *(यदि गइन भने प्रश्न नं. ८.१ मा जानुहोस)* *(If no, go to question no. 8.1)*
7.16 Did you go to your maiti after the birth?

७.१७ जन्मेको कति पछाडि जानुभयो ? ○ पहिलो हप्तामै In the first week ○ १ हप्ता देखि १ महिना भित्र Between 1 week and 1 month ○ १ महिना पछि After 1 month
7.17 How long after the birth did you go there?

७.१८ कति समयसम्म त्यहां बस्नु भयो ? ○ १ हप्ता सम्म Up to 1 week ○ १ हप्ता देखि १ महिना सम्म Between 1 week and 1 month ○ १ महिना भन्दा बढी Over 1 month
7.18 How long did you stay there?

७.१९ त्यहाँ सम्म पुग्न कति समय लाग्छ ? ☐☐ घण्टा Hours वा or ☐☐ दिन Days
7.19 How long does it take to get there?

८ आमाको दुध
8 Breastfeeding

८.१ तपाईले आफ्नो बच्चालाई दुध खुवाउनु भयो? ○ खुवाए Yes ○ खुवाइन No
8.1 Did you breastfeed your baby?

(यदि दुध नखुवाएको हो भने प्रश्न नं. ९.१ मा जानुहोस) *(If no, go to question no. 9.1)*

८.२ बच्चा जन्मिएको कति बेर पछि आमाको दुध चुसाउनु भयो? ☐☐ मिनेट पछि Minutes after वा or ☐☐ घण्टा पछि Hours after वा or ☐☐ दिन पछि Days after
8.2 How long after the birth did you first feed the baby?

८.३ बच्चालाई पहिलो पटक दुध खुवाउनु भन्दा अगाडी दुध निचोरेर फाल्नु भयो? ○ फालें Yes ○ फालिन No
8.3 Did you throw away any milk before the first time you fed the baby?

८.४ प्रत्येक पटक दुध खुवाउदा दुध निचोरेर फाल्नु हुन्छ ? ○ फाल्छु Yes ○ फाल्दिन No
8.4 Did you throw away any milk before each time you fed the baby?

८.५ तपाईले कति महिना सम्म दुध खुवाउनु भयो? ☐☐ महिना Months वा or ☐☐ वर्ष Years
8.5 For how many months did you breastfeed the baby?

८.६ कति हप्तादेखि बच्चालाई लगातार पाउडर दुध वा अन्य दुध खुवाउन शुरु गर्नु भयो? ☐☐ हप्ता Weeks वा or ☐☐ महिना Months
8.6 From how many weeks old did you start to give the baby powdered milk or other milk regularly ?
(यदि कहिले पनि भएन भने "००" लेख्नुहोस) *(If never, write '00')*

८.७ कति हप्ता देखि बच्चालाई पानी खुवाउन शुरु गर्नु भयो ? ☐☐ हप्ता Weeks वा or ☐☐ महिना Months
8.7 From how many weeks old did you start to give the baby water?
(यदि कहिले पनि भएन भने "००" लेख्नुहोस) *(If never, write '00')*

८.८ कति हप्ता पछि बच्चालाई पानी बाहेक अन्य झोलिलो खानेकुरा दिनु भयो ? ☐☐ हप्ता Weeks वा or ☐☐ महिना Months
8.8 From how many weeks old did you start to give the baby liquids other than water regularly ?
(यदि कहिले पनि भएन भने "००" लेख्नुहोस) *(If never, write '00')*

८.९ तपाईले कति हप्ता पछि बच्चालाई अन्य ठोस खानेकुरा दिनु भयो ? ☐☐ हप्ता Weeks वा or ☐☐ महिना Months
8.9 From how many weeks old did you start to give the baby solids regularly ?
(यदि कहिले पनि भएन भने "००" लेख्नुहोस) *(If never, write '00')*

८.१० बच्चालाई बोतलबाट केहि खानेकुरा खुवाइएको थियो ? ○ थियो Yes ○ थिएन No
8.10 Did you give the baby anything from a bottle?

९ बिगतको जन्महरु
9 Previous births

अब म तपाई संगै या अलग्गै बस्ने बच्चाको बारेमा प्रश्न सोध्न जाँदैछु ।
Now I am going to ask you some questions about your various children

छोरा
Sons

९.१ तपाईले जन्माएका छोराहरु मध्ये अहिले तपाईसंगै कति जना छन् ? □□ छोराहरु घरमा छन्
9.1 How many of your sons are now living with you? Sons at home
(यदि बच्चा संगै छैन भने कोष्ठ भित्र '००' लेख्नुहोस) (If none, write "00" in the boxes)

९.२ आफुले पाएका (जन्माएका) छोराहरु मध्ये कतिजना अन्यत्रै बस्छन ? □□ छोराहरु अन्यत्र छन्
9.2 How many of your sons are now living elsewhere? Sons elsewhere
(यदि बच्चा अन्यत्रै बस्दैन भने कोष्ठ भित्र '००' लेख्नुहोस) (If none, write "00" in the boxes)

९.३ त्यसो हो भने तपाईका जम्मा □□ जिवित छोराहरु छन्
9.3 That means that you have altogether... Living sons

छोरी
Daughters

९.४ तपाईले जन्माएका छोरीहरु मध्ये कति जना अहिले तपाईसंग घरमा छन् ? □□ छोरीहरु घरमा छन्
9.4 How many of your daughters are now living with you? Daughters at home
(यदि बच्चा संगै छैन भने कोष्ठ भित्र '००' लेख्नुहोस) (If none, write "00" in the boxes)

९.५ तपाईले जन्माएका छोरीहरु मध्ये कति जना अन्यत्रै बस्छन् ? □□ छोरीहरु अन्यत्र छन्
9.5 How many of your daughters are now living elsewhere? Daughters elsewhere
(यदि बच्चा अन्यत्रै बस्दैन भने कोष्ठ भित्र '००' लेख्नुहोस) (If none, write "00" in the boxes)

९.६ त्यसो हो भने तपाईका जम्मा □□ जिवित छोरीहरु छन्
9.6 That means that you have altogether... Living daughters

कहिलेकांही बच्चाहरु जन्मेर अलिकता चल्छन र मर्दछन । जस्तै बच्चाले पाखुरा वा खुट्टा चलाउन सक्छ अथवा एकछिन सास फेरेको देख्न सक्नु हुन्छ । कहिलेकांही बच्चाहरु केहि घण्टा या केहि दिन बांचेर मर्दछन ।
Sometimes babies are born, move a little bit and then die. For example, a baby might move her arm or leg, or might be seen to be breathing for a moment. Sometimes babies die after living for a few hours or days.

छोरा
Sons

९.७ कति जना तपाईका छोराहरु जन्मिएको सात दिन भित्र मरे ? □□ छोराहरु
9.7 How many of your sons died within 7 days of birth? Sons
(यदि बच्चा मरेको छैन भने कोष्ठ भित्र '००' लेख्नुहोस) (If none, write "00" in the boxes)

९.८ तपाईका कति जना छोराहरु जन्मिएको एक हप्ता पछि मरे ? □□ छोराहरु
9.8 How many of your sons died over a week after birth? Sons
(यदि बच्चा मरेको छैन भने कोष्ठ भित्र '००' लेख्नुहोस) (If none, write "00" in the boxes)

९.९ यस्को अर्थ तपाईका जम्मा □□ छोराहरु मरे
9.9 That means that you have altogether... Sons who died

छोरी
Daughters

९.१० कति जना तपाईका छोरीहरु जन्मिएको सात दिन भित्र मरे ? □□ छोरीहरु
9.10 How many of your daughters died within 7 days of birth? Daughters
(यदि बच्चा मरेको छैन भने कोष्ठ भित्र '००' लेख्नुहोस) (If none, write "00" in the boxes)

९.११ तपाईका कति जना छोरीहरु जन्मिएको एक हप्ता पछि मरे ? □□ छोरीहरु
9.11 How many of your daughters died over a week after birth? Daughters
(यदि बच्चा मरेको छैन भने कोष्ठ भित्र '००' लेख्नुहोस) (If none, write "00" in the boxes)

९.१२ यस्को अर्थ तपाईका जम्मा □□ छोरीहरु मरे
9.12 That means that you have altogether... Daughters who died

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१० विगतका बच्चाहरुको बिस्तृत बिवरण

10 Details of previous babies

तपाई आफ्नो पछिल्लो प्रसुती देखि शुरु गरेर जिवित जन्मेका सबै छोरा र छोरी (कोही अहिले मरिसकेका भएपनि)
Starting from your last delivery, can you tell me about all your sons and daughters born alive (even if they have now died)
का बारेमा बताउन सक्नु हुन्छ ?

*महिलाको **पछिल्लो** बच्चा देखि शुरु गर्नुहोस र प्रश्न सोध्नुहोस । प्रत्येक बच्चाको लागि विधि अपनाउनु होस*
(Start at the woman's most recent baby and ask the questions. Follow the process for each baby)

पछिल्लो बच्चा
Last baby

१०.१ बच्चाको नाम ..... (10.1 Name of baby)

१०.२ जन्मिएको गते, महिना र साल (10.2 Day, month and year of birth) ☐☐ गते Day ☐☐ महिना Month ☐☐ साल Year

१०.३ लिङ्ग (10.3 Sex) ○ पुरुष Male ○ महिला Female

१०.४ बच्चा जुम्ल्याहा मध्ये एक थियो ? (10.4 Was the baby one of twins?) ○ थियो Yes ○ थिएन No

१०.५ बच्चा अहिले जिवित छ ? (10.5 Is the baby now alive?) ○ छ Yes ○ छैन No *(यदि बच्चा जिवित छ भने प्रश्न नं. १०.७ मा जानुहोस)* *(If the baby is alive, go to question no. 10.7)*

१०.६ कुन मितिमा मरेको हो ? (10.6 What was the date of death?) ☐☐ गते Day ☐☐ महिना Month ☐☐ साल Year

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अर्को बच्चा
Next baby

१०.७ बच्चाको नाम ..... (10.7 Name of baby)

१०.८ जन्मिएको गते, महिना र साल (10.8 Day, month and year of birth) ☐☐ गते Day ☐☐ महिना Month ☐☐ साल Year

१०.९ लिङ्ग (10.9 Sex) ○ पुरुष Male ○ महिला Female

१०.१० बच्चा जुम्ल्याहा मध्ये एक थियो ? (10.10 Was the baby one of twins?) ○ थियो Yes ○ थिएन No

१०.११ बच्चा अहिले जिवित छ ? (10.11 Is the baby now alive?) ○ छ Yes ○ छैन No *(यदि बच्चा जिवित छ भने प्रश्न नं. १०.१३ मा जानुहोस)* *(If the baby is alive, go to question no. 10.13)*

१०.१२ कुन मितिमा मरेको हो ? (10.12 What was the date of death?) ☐☐ गते Day ☐☐ महिना Month ☐☐ साल Year

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अर्को बच्चा
Next baby

१०.१३ बच्चाको नाम ..... (10.13 Name of baby)

१०.१४ जन्मिएको गते, महिना र साल (10.14 Day, month and year of birth) ☐☐ गते Day ☐☐ महिना Month ☐☐ साल Year

१०.१५ लिङ्ग (10.15 Sex) ○ पुरुष Male ○ महिला Female

१०.१६ बच्चा जुम्ल्याहा मध्ये एक थियो ? (10.16 Was the baby one of twins?) ○ थियो Yes ○ थिएन No

१०.१७ बच्चा अहिले जिवित छ ? (10.17 Is the baby now alive?) ○ छ Yes ○ छैन No *(यदि बच्चा जिवित छ भने प्रश्न नं. १०.१९ मा जानुहोस)* *(If the baby is alive, go to question no. 10.19)*

१०.१८ कुन मितिमा मरेको हो ? (10.18 What was the date of death?) ☐☐ गते Day ☐☐ महिना Month ☐☐ साल Year

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अर्को बच्चा
Next baby

१०.१९ बच्चाको नाम ..... (10.19 Name of baby)

१०.२० जन्मिएको गते, महिना र साल (10.20 Day, month and year of birth) ☐☐ गते Day ☐☐ महिना Month ☐☐ साल Year

१०.२१ लिङ्ग (10.21 Sex) ○ पुरुष Male ○ महिला Female

१०.२२ बच्चा जुम्ल्याहा मध्ये एक थियो ? (10.22 Was the baby one of twins?) ○ थियो Yes ○ थिएन No

१०.२३ बच्चा अहिले जिवित छ ? (10.23 Is the baby now alive?) ○ छ Yes ○ छैन No *(यदि बच्चा जिवित छ भने अन्तर्वार्ता रोक्नुहोस)* *(If the baby is alive, stop the interview)*

१०.२४ कुन मितिमा मरेको हो ? (10.24 What was the date of death?) ☐☐ गते Day ☐☐ महिना Month ☐☐ साल Year

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मिरा मकवानपुर
मातृ तथा नवजात शिशु स्याहार कार्यक्रम

प्रसुति

Maternity questionnaire

घरधुरी परिचय
Household ID no.

गा. वि. स. नं. ☐☐ VDC no. वडा नं. ☐ Ward no.

टोल ..... Tol

क्षेत्र नम्बर ☐ Sector no. घरधुरी संख्या ☐☐☐ Household no.

अन्तर्वार्ता लिएको मिति
Interview date
☐☐ गते day ☐☐ महिना month ☐☐ साल year

अन्तर्वार्ता लिनेको परिचय संख्या ☐☐
Interviewer no.

MWRA को नाम ..... MWRA name

MWRA को परिचय संख्या ☐☐ ☐☐ ☐☐☐ ☐ MWRA ID no.

१ प्रसुतीपूर्वको हेरचाह
1 Antenatal care

MWRA को तौल ☐☐.☐ Kg MWRA weight

१.१ यो गर्भावस्थामा तपाई जचाउन जानु भयो ? 1.1 Did you go for a check-up during this pregnancy?
○ गएँ Yes ○ गइन No *(यदि गइन भने प्रश्न नं. १.८ मा जानुहोस्) (if no, go to question no. 1.8)*

१.२ गर्भावस्थामा जचाउन कहाँ जानु भयो ? 1.2 Where did you go for the check-up?
☐ अस्पताल Hospital ☐ प्रा. स्वा. के. PHC ☐ स्वा. चौ. HP
☐ उप-स्वा.चौ. SHP ☐ गाउँघर क्लिनिक Mobile clinic ☐ परिवार नियोजन क्लिनिक Family planning clinic
☐ प्राइभेट क्लिनिक Private clinic ☐ अन्य..... Other

१.३ को संग जचाउनु भयो ? 1.3 Who did you see for the check-up?
☐ डाक्टर Doctor ☐ नर्स Nurse ☐ अ. न. मी. ANM
☐ हे.अ.÷सि.अ.हे.ब.÷अ.हे.ब.÷सि.एम.ए. HA/SAHW/AHW/CMA ☐ तालीम प्राप्त सुडेनी Trained TBA ☐ तालीम नपाएको सुडेनी Untrained TBA
☐ मात् शिशु स्वास्थ्य कार्यकर्ता MCHW ☐ ग्रामिण स्वास्थ्य कार्यकर्ता VHW ☐ महिला स्वास्थ्य स्वय्म सेवीका FCHV
☐ थाहा छैन Don't know ☐ अन्य ..... Other

१.४ कति महिनाको गर्भवती हुँदा पहिलो पटक जचाउन जानुभयो ? 1.4 How many months pregnanct were you when you first went for a check up? ☐☐ महिना Months

१.५ कतिपटक जचाउनु भयो ? 1.5 How many times did you go for a check-up? ☐☐ पटक Times

१.६ पहिलो पटक किन जचाउन जानु भयो ? 1.6 Why did you go for a check up the first time?
○ समस्या भएर For a problem ○ सबै कुरा ठिक छ कि छैन भनेर Just for a check-up
(यदि समस्या नभएमा प्रश्न नं. १.८ मा जानुहोस्) (if no problem, go to question no. 1.8)

१.७ के समस्या थियो ? 1.7 What was the problem
○ योनीबाट रगत बगेको थियो Vaginal bleeding
○ योनी बाट पानी बग्ने Vaginal discharge
○ पेट दुख्ने Stomach pain
○ पहेंलो हुने Jaundice
○ टाउको दुख्ने, कमजोरी, मुर्छा पने, रिङ्गटा लाग्ने Headache, weakness, fainting, dizziness
○ बच्चाको अवस्था ठिक नभएर Baby's condition abnormal
○ हात, खुट्टा,मुख सुन्नीने Swollen hands, feet, or face
○ पछिल्लो गर्भ अवस्थाका समस्याको कारण Problems in the previous pregnancy
○ बान्ता हुने,खाना खान मन नलाग्ने Nausea, off food
○ अन्य ..... Other

टि. टि.
TT

१.८ तपाईले यस गर्भावस्थामा टि. टि. सूई लिनु भएको छ ? ○ छ ○ छैन ○ थाहा छैन
1.8 Did you have any TT injections during this pregnancy? Yes No Don't know

१.९ यस गर्भावस्थामा कति पटक लगाउनु भयो ? ☐☐ टि. टि.
1.9 How many did you have during this pregnancy? TT

(यदि छैन वा थाहा छैन भने प्रश्न नं. १.१० मा जानुहोस)
(If no or don't know, go to question no. 1.10)

औषधी
Medicine

१.१० यस गर्भावस्थामा भिटामीन र आइरन चक्कि खानु भयो ? ○ खाँए ○ खाइन ○ थाहा छैन
1.10 Did you take any vitamin and iron during this pregnancy? Yes No Don't know

(यदि खाइन वा थाहा छैन भने प्रश्न नं. २.१ मा जानुहोस)
(If no or don't know, go to question no. 2.1)

१.११ कति समय सम्म खानु भयो ? ☐☐ हप्ता वा ☐☐ महिना
1.11 For how long did you take it? weeks or months

२ गर्भावस्थाका समस्या
2 Problems in pregnancy

प्रसव हुन भन्दा ७ दिन अगाडि
The seven days before labour

२.१ रगत बगेको थियो ? ○ थियो ○ थिएन *(यदि थिएन भने प्रश्न नं. २.६ जानुहोस)*
2.1 Did you have vaginal bleeding? Yes No *(If no, go to question no. 2.6)*

२.२ रगतले लुगा, ओछ्यान वा जमिन भिजेको थियो ? ○ थियो ○ थिएन
2.2 Did the blood soak your clothes, the mattress or the floor? Yes No

२.३ तपाईको पेट पनि दुखेको थियो ? ○ थियो ○ थिएन
2.3 Did you also have stomach pain? Yes No

२.४ रगत बगेको बेला योनी जाँच गराउनु भएको थियो ? ○ थियो ○ थिएन *(यदि थिएन भने प्रश्न नं. २.६ जानुहोस)*
2.4 Did you have a vaginal examination during the bleeding? Yes No *(If no, go to question no. 2.6)*

२.५ योनी जाँच गरे पछि रगत ज्यादा बगेको थियो ? ○ थियो ○ थिएन
2.5 Did the bleeding get worse after the vaginal examination> Yes No

२.६ तपाईलाई कम्पनहरु आएको थियो ? ○ थियो ○ थिएन
2.6 Did you have any convulsions? Yes No

२.७ तपाईलाई आधा दिन भन्दा बढी नराम्रोसंग कपाल दुखेको थियो ? ○ थियो ○ थिएन
2.7 Did you have a headache for more than half a day? Yes No

२.८ तपाईको अनुहार सुन्निएको थियो ? ○ थियो ○ थिएन
2.8 Did you have a headache for more than half a day? Yes No

२.९ तपाईको खुट्टाहरु सुन्निएको थियो ? ○ थियो ○ थिएन
2.9 Did you have a headache for more than half a day? Yes No

२.१० तपाईको आँखा धमिलो भएको थियो ? ○ थियो ○ थिएन
2.10 Did you have a headache for more than half a day? Yes No

२.११ तपाईले आफ्नो ब्लड प्रेसर जचाउनु भएको थियो ? ○ थियो ○ थिएन *(यदि थिएन भने प्रश्न नं. २.१३ जानुहोस)*
2.11 Did you have a headache for more than half a day? Yes No *(If no, go to question no. 2.13)*

२.१२ तपाईलाई थाहा छ तपाईको ब्लड प्रेसर कस्तो थियो ? ○ कम ○ ठिक ○ बढी ○ थाहा छैन
2.12 Did you have a headache for more than half a day? Low Normal High Don't know

२.१३ तपाईलाई २४ घण्टा भन्दा बढी लगातार धेरै ज्वरो आएको थियो ? ○ थियो ○ थिएन
2.13 Did you have a headache for more than half a day? Yes No

२.१४ पिसाब पोलेको थियो ? ○ थियो ○ थिएन
2.14 Did you have a headache for more than half a day? Yes No

२.१५ २४ घण्टा भन्दा बढी गन्हाउने पानी बगेको थियो ? ○ थियो ○ थिएन
2.15 Did you have a headache for more than half a day? Yes No

२.१६ दैनिक घरायसी कार्य गर्दा तपाईलाई स्याँ स्याँ हुने गरेको थियो ? ○ थियो ○ थिएन
2.16 Did you have a headache for more than half a day? Yes No

२.१७ तपाई फुस्रो देखिनु भएको थियो ? ○ थियो ○ थिएन ○ थाहा छैन
2.17 Did you have a headache for more than half a day? Yes No Don't know

२.१८ मैले सोधेका सबै कुराहरु बाहेक, तपाई गर्भवती हुँदा कुनै सिकिस्त बिरामी वा दुर्घटनामा पर्नु भएको थियो ?
2.18 Did you have a headache for more than half a day?

○ थियो ○ थिएन *(यदि थिएन भने प्रश्न नं. ३.१ जानुहोस)*
Yes No *(If no, go to question no. 3.1)*

२.१९ वर्णन .....
2.19 Fill in...
.....
.....

३ सुत्केरी
3 Delivery

३.१ कति समय प्रसव व्यथा लागेको थियो ? ☐☐ घण्टा Hours वा or ☐☐ दिन Days
3.1 How long did your labour last?

३.२ बच्चा जन्मनु भन्दा २४ घण्टा अगाडि सानो सुतक भएको थियो ? ○ थियो Yes ○ थिएन No ○ थाहा छैन Don't know
3.2 Did the waters break more than 24 hours before the baby was born?

३.३ पानी गन्हाउने थियो ? ○ थियो Yes ○ थिएन No ○ थाहा छैन Don't know
3.3 Were the waters foul?

३.४ पानीको रङ्ग कस्तो थियो ? ○ सफा Yes ○ खैरो Yes ○ थाहा छैन Don't know ○ अन्य Other .....
3.4 What colour were the waters?

३.५ सब भन्दा पहिला बच्चाको कुनचाँही अंग बाहिर निस्कीयो ?
3.5 Which part of the baby came out first?
○ टाउको Head ○ चाक Breech ○ हात÷खुट्टा Hand/Foot ○ नाल Cord ○ थाहा छैन Don't know

३.६ बच्चा कसरी बाहिर निस्कीयो÷निकालियो ? ○ आफै On its own ○ हातले Manually ○ औजार प्रयोग गरेर Forceps ○ पेट चिरेर Operatively
3.6 How was the baby delivered?

३.७ व्यथा लागेको बेला वा व्यथा लाग्नु भन्दा अगाडि कुनै औषधी खानु भएको थियो ? ○ थियो Yes ○ थिएन No
3.7 Did you take any sort of medicine before or during the labour?

३.८ व्यथा लागेको बेला वा व्यथा लाग्नु भन्दा अगाडि कुनै घरेलु औषधि खानु भएका थियो ? ○ थियो Yes ○ थिएन No
3.8 Did you take any sort of traditional remedy before or during the labour?

४ प्रसवको बेलामा बिरामी भएको
4 Illness during labour

४.१ व्यथा लागेको बेला रगत बगेको थियो ? ○ थियो Yes ○ थिएन No *(यदि थिएन भने प्रश्न नं. ४.६ मा जानुहोस)* *(If no, go to question no. 4.6)*
4.1 During the labour, did you have vaginal bleeding?

४.२ रगतले लुगा, ओछ्यान वा जमिन भिजेको थियो ? ○ थियो Yes ○ थिएन No
4.2 Did the blood soak your clothes, the mattress or the floor?

४.३ रगत बगेको बेलामा पेट दुखेको थियो ? ○ थियो Yes ○ थिएन No
4.3 Did your stomach hurt during the bleeding?

४.४ रगत बगेको बेलामा योनी जाँच गरेको थियो ? ○ थियो Yes ○ थिएन No *(यदि थिएन भने प्रश्न न. ४.६ मा जानुहोस)* *(If no, go to question no. 4.6)*
4.4 Did you have a vaginal examination during the bleeding?

४.५ योनी जाँच गरे पछि रगत ज्यादा बगेको थियो ? ○ थियो Yes ○ थिएन No
4.5 Did the vaginal examination make the bleeding worse?

४.६ तपाईलाई कम्पनहरु आएको थियो ? ○ थियो Yes ○ थिएन No
4.6 Did you have any fits?

४.७ व्यथा लाग्नु भन्दा ३ दिन अगाडि धेरै ज्वरो आएको थियो ? ○ थियो Yes ○ थिएन No
4.7 In the three days before the labour, did you have a high fever?

४.८ व्यथा लाग्नु भन्दा ३ दिन अगाडि गन्हाउने पानी बगेको थियो ? ○ थियो Yes ○ थिएन No
4.8 In the three days before the labour, did you have a vaginal discharge?

४.९ बच्चा पाईसकेपछि रगत बगेको थियो ? ○ थियो Yes ○ थिएन No *(यदि थिएन भने प्रश्न न. ४.११ मा जानुहोस)* *(If no, go to question no. 4.11)*
4.9 After the baby was born, did you have vaginal bleeding?

४.१० रगतले लुगा, ओछ्यान वा जमिन भिजेको थियो ? ○ थियो Yes ○ थिएन No
4.10 Did it soak your clothes, the mattress or the floor?

४.११ बच्चा जन्मेको कति समय पछि साल झ्च्यो ?
4.11 How long after the baby was born did the placenta come out?
○ ३० मिनेट भित्र Within 30 minutes ○ ३० मिनेट देखि १ घण्टा सम्म Between 30 minutes and 1 hour later ○ १ घण्टा देखि ६ घण्टा सम्म Between 1 and 3 hours later
○ ६ घण्टा देखि १२ घण्टा सम्म Between 3 and 12 hours later ○ १२ घण्टा देखि २४ घण्टा सम्म Between 12 and 24 hours later
○ २४ घण्टा भन्दा बढी More than 24 hours later

४.१२ के साल पुरै निस्केको थियो कि टुक्रा टुक्रा निस्केको थियो ? ○ पुरै Whole ○ टुक्रा टुक्रा In pieces ○ थाहा छैन Don't know
4.12 Did the placenta come out whole or in pieces?

४.१३ मैले सोधेका सबै कुराहरु बाहेक, प्रसवको समयमा केहि गंभीर समस्या भएको थियो ? ○ थियो Yes ○ थिएन No
4.13 Apart from the questions that I have asked, did you have any other problems in the labour?
(यदि थिएन भने प्रश्न न. ५.१ मा जानुहोस) *(If no, go to question no. 5.1)*

४.१४ वर्णन .....
4.14 Fill in...
.....
.....
.....

५ बच्चा पाइसकेपछिको बिरामी
4 Illness after the birth of the baby

५.१ २४ घण्टा भन्दा वढी लगातार धेरै ज्वरो आएको थियो ? ○ थियो Yes ○ थिएन No *(यदि थिएन भने प्रश्न नं. ५.३ मा जानुहोस्)* *(If no, go to question no. 5.3)*
4.1 Have you had a fever continuously for more than 24 hours?

५.२ कति दिन सम्म आएको थियो ? ☐☐ दिन Days
4.2 How many days did it last?

५.३ २४ घण्टा भन्दा वढी गन्हाउने पानी बगेको थियो ? ○ थियो Yes ○ थिएन No *(यदि थिएन भने प्रश्न नं. ५.५मा जानुहोस्)* *(If no, go to question no. 5.5)*
4.3 Have you had vaginal discharge for more than 24 hours?

५.४ कति दिन सम्म बगेको थियो ? ☐☐ दिन Days
4.4 How many days did it last?

५.५ दैनिक घरायसी कार्य गर्दा तपाईलाई सास फेर्न गाह्रो भएको थियो ? ○ थियो Yes ○ थिएन No
4.5 Have you been short of breath doing household work?

५.६ तपाई फुस्रो देखिनु भएको थियो ? ○ थियो Yes ○ थिएन No ○ थाहा छैन Don't know
4.6 Have you been looking pale?

५.७ तपाईलाई रातको समयमा हेर्नलाई कठिनाई भएको थियो ? ○ थियो Yes ○ थिएन No ○ थाहा छैन Don't know
4.7 Have you had difficulty seeing at night?

५.८ मैले सोधेका सबै कुराहरु बाहेक, तपाई गर्भवती भएको बेलामा धेरै बिरामी वा दुर्घटनामा पर्नु भएको थियो ?
4.8 Apart from the questions that I have asked, have you have any other problems or accidents?
○ थियो Yes ○ थिएन No *(यदि थिएन भने प्रश्न नं. ६.१मा जानुहोस्)* *(If no, go to question no. 6.1)*

५.९ वर्णन .....
4.9 Fill in...
.....

६ स्वास्थ्य उपचार
6 Health care

(माथि सोधिएका प्रश्नहरुमा केही समस्या भएमा पहिलो समस्याको बारेमा तलका प्रश्नहरु सोध्नुहोस्)
(If any problems were found in the above questions, ask the following questions about the first of these)

धामी
Dhaami

(यदि छैन भने अन्तर्वार्ता रोक्नुहोस्)
(If there were none, stop the interview)

६.१ तपाई विरामी उपचार गर्नुलाई धामी कहाँ जानु भयो? ○ गएँ Yes ○ गइन No
6.1 Did you go to the Dhaami for any treatment when you were ill?

स्वास्थ्य संस्था
Health service

६.२ तपाई विरामी उपचार गर्नुलाई स्वास्थ्य संस्थामा जानु भयो? ○ गएँ Yes ○ गइन No
6.2 Did you go to the health service for any treatment?
(यदि जानुभएन भने प्रश्न नं. ६.७ जानुहोस्) *(If no, go to question no. 6.7)*

६.३ कहाँ जचाउन जानु भएको थियो ?
6.3 Where did you go for the consultation?

☐ अस्पताल Hospital ☐ प्रा. स्वा. के. Primary Health Centre ☐ स्वा. चौ. Health Post
☐ उप-स्वा.चौ. Sub Health Post ☐ गाउँघर क्लिनिक Mobile clinic ☐ परिवार नियोजन क्लिनिक Family Planning clinic
☐ प्राइभेट क्लिनिक Private clinic ☐ औषधी पसल Medicine shop ☐ अन्य ..... Other

६.४ तपाईले को संग उपचार गराउनु भयो ?
6.4 Who did you get treatment from?

☐ डाक्टर Doctor ☐ नर्स Nurse ☐ अ. न. मी. ANM
☐ हे.अ.÷सि.अ.हे.ब.÷अ.हे.ब.÷सि.एम.ए. HA/SAHW/AHW/CMA ☐ तालीम प्राप्त सुडेनी Trained TBA ☐ तालीम नपाएको सुडेनी Untrained TBA
☐ मात् शिशु स्वास्थ्य कार्यकर्ता MCHW ☐ ग्रामिण स्वास्थ्य कार्यकर्ता VHW ☐ महिला स्वास्थ्य स्वयम् सेवीका FCHV
☐ औषधी पसले Medicine shopkeeper ☐ थाहा छैन Don't know ☐ अन्य ..... Other

६.५ कसरी त्यहाँ (पुगाइयो) पुग्नु भयो ?
6.5 How did you get there?

☐ हिंडेर Walked ☐ बोकेर Carried ☐ गाडामा Cart ☐ एम्बुलेन्स Ambulance ☐ गाडी÷टेम्पो÷बस÷रिक्सा Car/tempo/bus/rickshaw

६.६ बिरामी भएको कति समयपछि तपाई त्यहां पुग्नु भयो ? ☐☐ घण्टा पछि Hours वा or ☐☐ दिन पछि Days after
6.6 How long after you became ill did you arrive there?

उपचार
Treatment

६.७ तपाई बिरामी हुंदा कुनै प्रकारको उपचार लिनु भयो ? ○ लिए Yes ○ लिइन No *(यदि लिएन भने अन्तर्वार्ता रोक्नुहोस्)* *(If no, stop the interview)*
6.7 When you were ill did you take any sort of medi cine?

६.८ के लिनु भयो ? ○ औषधि Allopathic medicine ○ घरेलु औषधि उपचार Traditional medicine ○ औषधि र घरेलु औषधि उपचार Allopathic and traditional medicine
6.8 What did you take?
○ अन्य ..... Other

६.९ बिरामी भएको कति समय पछि उपचार पाउनु भयो ? ☐☐ घण्टा पछि Hours after वा or ☐☐ दिन पछि Days after वा or ☐☐ हप्ता पछि Weeks after
6.9 How long after you became ill did you take the medicine?

मिरा मकवानपुर

मातृ तथा नवजात शिशु स्याहार कार्यक्रम

गर्भवती प्रश्नावली

Pregnancy questionnaire

घरधुरी परिचय

Household ID no.

गा. वि. स. नं. VDC no. ☐☐ वडा नं. Ward no. ☐

टोल Tol .....

क्षेत्र नम्बर Sector no. ☐ घरधुरी संख्या Household no. ☐☐☐

अन्तर्वार्ता लिएको मिति Interview date

☐☐ गते day ☐☐ महिना month ☐☐ साल year

अन्तर्वार्ता लिनेको परिचय संख्या Interviewer no. ☐☐

MWRA को नाम MWRA name .....

MWRA को परिचय संख्या MWRA ID no. ☐☐ ☐☐ ☐☐☐ ☐

१ शुरु गर्भाअवस्थाका विरामहरु

1 Illness in early pregnancy

रगत बग्ने समस्या

Bleeding problems

१.१ तपाईको रगत बग्ने समस्या छ ? 1.1 Have you had a bleeding problem? ○ थियो Yes ○ थिएन No *(यदि थिएन भने प्रश्न नं. १.४ मा जानुहोस)* (If no, go to question no. 1.4)

१.२ तपाईको लुगा, ओछ्यान र भुइं पनि भिजायो ? 1.2 Did the bleeding soak your clothes, the mattress and the floor? ○ भिजायो Yes ○ भिजाएन No

१.३ तपाईलाई पेट पनि दुखेको थियो ? 1.3 Did you also have stomach pain? ○ थियो Yes ○ थिएन No

ज्वरो

१.४ तपाईलाई २४ घण्टा भन्दा बढि लगातार धेरै ज्वरो आएको थियो ? 1.4 Have you had a fever for longer than 24 hours? ○ थियो Yes ○ थिएन No

(यदि थिएन भने प्रश्न नं. १.६ मा जानुहोस) (If no, go to question no. 1.6)

१.५ कति दिनसम्म त्यस्तो ज्वरो आयो ? 1.5 For how many days did this fever last? ☐☐ दिन Days

गन्हाउने पानी

Foul vaginal discharge

१.६ गन्हाउने पानी आएको थियो ? 1.6 Have you had a foul vaginal discharge? ○ थियो Yes ○ थिएन No

(यदि थिएन भने प्रश्न नं. १.८ मा जानुहोस) (If no, go to question no. 1.8)

१.७ कति दिन सम्म आयो ? 1.7 How long did it last? ☐☐ दिन Days

१.८ तपाईको अन्य कुनै समस्या वा दुर्घट्ना भएको थियो ? Have you had any other problem or accident? ○ थियो Yes ○ थिएन No

(यदि थिएन भने अन्तर्वार्ता रोक्नुहोस) (If no, stop the interview)

१.९ वर्णन Fill in... .....

.....

.....

.....

.....

.....

मिरा मकवानपुर

मातृ तथा नवजात शिशु स्याहार कार्यक्रम

१ महिनाको शिशु

घरधुरी परिचय
Household ID no.

Infant 1 month questionnaire

गा. वि. स. नं. ☐☐ (VDC no.) वडा नं. ☐ (Ward no.)

टोल .....

क्षेत्र नम्बर ☐ (Sector no.) घरधुरी संख्या ☐☐☐ (Household no.)

अन्तर्वार्ता लिएको मिति (Interview date)
☐☐ गते (day) ☐☐ महिना (month) ☐☐ साल (year)

अन्तर्वार्ता लिनेको परिचय संख्या (Interviewer no.) ☐☐

MWRA को नाम (MWRA name) .....

MWRA को परिचय संख्या (MWRA ID no.) ☐☐ ☐☐ ☐☐☐ ☐

शिशुको नाम (Infant name) ..... उत्तर दिने व्यक्तिको नाम (Respondent name) .....

उत्तर दिने व्यक्तिको शिशु संगको सम्बन्ध (Relation of respondent to infant)

☐ आमा (Mother) ☐ बुबा (Father) ☐ मामा तर्फको परिवार (Mother's family)
☐ बुबा तर्फको परिवार (Father's family) ☐ छिमेकी (Neighbour) ☐ अन्य (Other) .....

१ शिशु जन्मेको समयमा
1 At the time of birth

बच्चाको तौल (Infant's weight) ☐•☐ Kg

१.१ बच्चा कहिले जन्मेको थियो ? (When was the baby born?) ☐☐ गते (day) ☐☐ महिना (month) ☐☐ साल (year)

१.२ बच्चा छोरा हो कि छोरी हो ? (Is the baby a boy or a girl?) ○ छोरा (Boy) ○ छोरी (Girl)

१.३ कति महिनाको गर्भवती हुँदा बच्चा जन्मियो ? (After how many months of pregnancy was the baby born?) ☐☐ महिना (months)

१.४ जन्मेको समयमा बच्चा हेर्दा कस्तो देखिन्थ्यो ? (How did the baby look at birth?) ○ सामान्य (Normal) ○ असामान्य (Abnormal)
(यदि सामान्य थियो भने प्रश्न नं. १.६ मा जानुहोस्) (If normal, go to question no. 1.6)

१.५ असामान्य भए लेख्नुहोस (If abnormal, describe) .....

१.६ बच्चाको आकार कस्तो थियो ? (How was the baby's size?) ○ धेरै सानो (Very small) ○ ठिक (Normal) ○ धेरै ठूलो (Very big)

१.७ के बच्चा जुम्ल्याहा हो ? (Is the baby a twin) ○ हो (Yes) ○ होइन (No) *(यदि होइन भने प्रश्न नं. १.९ मा जानुहोस्)* (If no, go to question no. 1.9)

१.८ यो बच्चा पहिला वा दोश्रो कहिले जन्मिएको थियो ? (Was this baby born first or second?) ○ पहिलो (First) ○ दोश्रो (Second) ○ थाहा छैन (Don't know)

१.९ बच्चाको टाउको चेप्टो परेको थियो ? (Was the baby's head squashed?) ○ थियो (Yes) ○ थिएन (No) ○ थाहा छैन (Don't know)

१.१० बच्चाको शरीरमा निला टाटाहरु थियो ? (Was there bruising on the baby's body?) ○ थियो (Yes) ○ थिएन (No) ○ थाहा छैन (Don't know)

२ नवजात शिशु स्याहार
2 Newborn care

२.१ बच्चा कहाँ जन्मिएको थियो ? (Where was the baby born?)
○ घरमा (House) ○ गोठमा (Shed) ○ खेत÷बारी÷जंगल (Fields/woods) ○ आंगन, पिडि, छत (Area around the house)
○ अस्पताल (Hospital) ○ प्राइभेट क्लिनिक (Private clinic) ○ अन्य (Other) .....

२.२ सुत्केरी कोठालाई आगो÷स्टोभ अथवा अन्य साधनले कहिले तताइएको थियो ? (Was there a fire, stove or other form of heating in the delivery room?)
○ बच्चा जन्मनु भन्दा अगाडी (Before the baby was born) ○ बच्चा जन्मि सके पछि (After the baby was born)
○ बच्चा जन्मनु भन्दा अगाडी र पछि (Before and after the baby was born) ○ थिएन (No)

२.३ सुत्केरी हुंदा कस्ले सहयोग गऱ्यो ?
2.3 Who helped with the delivery?

☐ डाक्टर Doctor ☐ नर्स Nurse ☐ अ. न. मी. ANM
☐ हे.अ.÷सि.अ.हे.ब.÷अ.हे.ब.÷सि.एम.ए. HA/SAHW/AHW/CMA ☐ तालीम प्राप्त सुडेनी Trained TBA ☐ तालीम नपाएको सुडेनी Untrained TBA
☐ मातृ शिशु स्वास्थ्य कार्यकर्ता MCHW ☐ ग्रामिण स्वास्थ्य कार्यकर्ता VHW ☐ महिला स्वास्थ्य स्वयम् सेवीका FCHV
☐ सासु Mother-in-law ☐ परिवारका सदस्य Family member ☐ छिमेकी÷साथी Neighbour/friend
☐ आफै (कोही पनि नभएको) Alone (nobody helped) ☐ अन्य Other .....

(यदि कसैले सहत गरेको थिएन भने प्रश्न नं. २.५ मा जानुहोस)
(If nobody helped, go to question no. 2.5)

२.४ सहयोग गर्ने मानिसले हात धोएको थियो ? ○ थियो Yes ○ थिएन No ○ थाहा छैन Don't know
2.4 Did the person who helped wash her hands?

२.५ यो के हो ? चिन्नु हुन्छ ? *(सुत्केरी सामग्री देखाउने)* ○ चिन्छु Yes ○ चिन्दिन No
2.5 Do you know what this is? *(Show a Clean Home Delivery Kit)*

(यदि चिन्दैन भने प्रश्न नं. २.७ मा जानुहोस)
(If she does not know, go to question no. 2.7)

२.६ सुत्केरी सामाग्री प्रयोग गर्नु भयो ? ○ गरे Yes ○ गरिन No
2.6 Did you use a Clean Home Delivery Kit?

२.७ नाल के ले काट्नु भयो ?
2.7 What was the cord cut with?

○ उमालेको पत्तीले Boiled blade ○ नउमालेको पत्तीले Unboiled blade ○ चक्कु÷छुरी÷कैंचि Knife ○ हसिया÷खुर्पा Sickle/woodknife
○ बाँसले bamboo stick ○ थाहा छैन Don't know ○ अन्य Other .....

२.८ नाभी काटि सके पछि के लगाउनु भयो ?
2.8 What was put on the cord after it was cut?

○ तेल Oil ○ बेसार Turmeric ○ नधोएको कपडा वा कपास Unwashed cloth ○ धोएको कपडा वा कपास Washed cloth
○ औषधि, डेटोल Medicine/Dettol ○ पाउडर Powder ○ माटो Mud ○ केहि नराखेको Nothing
○ थाहा छैन Don't know ○ अन्य Other .....

२.९ बच्चालाई कस्तो कपडाले बेरिएको थियो ? ○ नयां कपडा New cloth ○ पुरानो कपडा Old cloth ○ थाहा छैन Don't know
2.9 What sort of cloth was the baby wrapped in?

२.१० बच्चालाई बेर्ने कपडा धोएको थियो ? ○ थियो Yes ○ थिएन No ○ थाहा छैन Don't know
2.10 Had the cloth been washed?

२.११ बच्चा जन्मिएको कति बेर पछि बच्चालाई कपडाले बेरिएको थियो ? ☐☐ मिनेट पछि Minutes after वा or ☐☐ घण्टा पछि Hours after
2.11 How long after birth was the baby wrapped up?

२.१२ जन्मिएको कति समय पछि बच्चालाई नुहाउनु भयो ? ☐☐ मिनेट पछि Minutes after वा or ☐☐ घण्टा पछि Hours after वा or ☐☐ दिन पछि Days after
2.12 How long after birth was the baby bathed?

२.१३ बच्चालाई पहिलो पटक के खान दिइयो ?
2.13 What was the first food given to the baby?

○ आमाको दुध Breastmilk ○ अरु आमाको दुध Other woman's milk ○ गाई÷भैसिको दुध Cow/buffalo milk ○ ल्याक्टोजेन Formula
○ दुध खाना Milk food ○ घ्यु Ghee ○ घ्यु र चिनी Ghee and sugar ○ घ्यु र मह Ghee and honey
○ चिनी Sugar ○ मह Honey ○ तेल Oil ○ थाहा छैन Don't know
○ अन्य Other .....

२.१४ बच्चा जन्मिसकेपछि माइती जानुभयो ? ○ गएं Yes ○ गइन No *(यदि गइन भने प्रश्न नं. २.१७ मा जानुहोस)*
2.14 Did you go to your maiti after the birth? *(If no, go to question no. 2.17)*

२.१५ जन्मेको कति पछाडि जानुभयो ? ○ पहिलो हप्तामै In the first week ○ १ हप्ता देखि १ महिना भित्र Between 1 week and 1 month ○ १ महिना पछि After 1 month
2.15 How long after the birth did you go there?

२.१६ कति समयसम्म त्यहां बस्नु भयो ? ○ १ हप्ता सम्म Up to 1 week ○ १ हप्ता देखि १ महिना सम्म Between 1 week and 1 month ○ १ महिना भन्दा बढी Over 1 month
2.16 How long did you stay there?

२.१७ त्यहाँ सम्म पुग्न कति समय लाग्छ ? ☐☐ घण्टा Hours वा or ☐☐ दिन Days
2.17 How long does it take to get there?

२.१८ तपाईको बच्चालाई बि. सि. जि. खोप दिई सक्नु भयो ? ○ दियो Yes ○ दिएको छैन No ○ थाहा छैन Don't know
2.18 Has your baby had the BCG immunisation?

३ आमाको दुध
3 Breastfeeding

३.१ तपाईले आफ्नो बच्चालाई आमाको दूध खुवाउनु भयो ? ○ खुवाए ○ खुवाइन
3.1 Have you breastfeed your baby? Yes No

(यदि दूध नखुवाएको हो भने प्रश्न नं. ४.१ मा जानुहोस)
(If no, go to question no. 4.1)

३.२ बच्चा जन्मिएको कति बेर पछि आमाको दुध चुसाउनु भयो ? ☐☐ मिनेट पछि वा ☐☐ घण्टा पछि वा ☐☐ दिन पछि
3.2 How long after the birth did you first feed the baby? Minutes after or Hours after or Days after

३.३ बच्चालाई पहिलो पटक दुध खुवाउनु भन्दा अगाडी दुध निचोरेर फाल्नु भयो ? ○ फालें ○ फालिन
3.3 Did you throw away any milk before the first time you fed the baby? Yes No

३.४ प्रत्येक पटक दुध खुवाउदा दुध निचोरेर फाल्नु हुन्छ ? ○ फाल्छु ○ फाल्दिन
3.4 Do you throw away any milk before each time you fed the baby? Yes No

३.५ आमाको दुध बाहेक पाउडरको दुध वा अन्य दुध बच्चालाई खुवाउने गर्नु भएको छ ? ○ खुवाए ○ खुवाएको छैन
3.5 Apart from breastmilk, have you given your baby powdered milk or another type of milk? Yes No

(यदि खुवाएको छैन भने प्रश्न नं. ३.७ मा जानुहोस)
(If no, go to question no. 3.7)

३.६ जन्मेको कति हप्ता पछि खुवाउन शुरु गर्नु भएको थियो ? ☐ हप्ता पछि
3.6 How many weeks after the birth did you start? weeks after

३.७ आमाको दुध बाहेक बच्चालाई दिनहुँ सादा पानी खुवाउने गर्नु भएको छ ? ○ खुवाए ○ खुवाएको छैन
3.7 Apart from breastmilk, have you given your baby water? Yes No

(यदि खुवाएको छैन भने प्रश्न नं. ३.९ मा जानुहोस)
(If no, go to question no. 3.9)

३.८ जन्मेको कति हप्ता पछि खुवाउन शुरु गर्नु भएको थियो ? ☐ हप्ता पछि
3.8 How many weeks after the birth did you start? weeks after

३.९ आमाको दुध बाहेक बच्चालाई दिनहुँ अरु झोल पदार्थ पनि खुवाउने गर्नु भएको छ ? ○ खुवाए ○ खुवाएको छैन
3.9 Apart from breastmilk, have you given your baby other liquids? Yes No

(यदि खुवाएको छैन भने प्रश्न नं. ३.११ मा जानुहोस)
(If no, go to question no. 3.11)

३.१० जन्मेको कति हप्ता पछि खुवाउन शुरु गर्नु भएको थियो ? ☐ हप्ता पछि
3.10 How many weeks after the birth did you start? weeks after

३.११ आमाको दुध बाहेक अरु कुनै ठोस वा नरम खाना पनि दिनहुँ खुवाउने गर्नु भएको छ ? ○ खुवाए ○ खुवाएको छैन
3.11 Apart from breastmilk, have you given your baby solids? Yes No

(यदि खुवाएको छैन भने प्रश्न नं. ३.१३ मा जानुहोस)
(If no, go to question no. 3.13)

३.१२ जन्मेको कति हप्ता पछि खुवाउन शुरु गर्नु भएको थियो ? ☐ हप्ता पछि
3.12 How many weeks after the birth did you start? weeks after

३.१३ बच्चालाई बोतलबाट केहि खानेकुरा खुवाइएको थियो ? ○ थियो ○ थिएन
3.13 Have you given any of these things from a bottle? Yes No

४ बच्चा बिरामी सम्बन्धमा
4 Illness in the infant

४.१ बच्चालाई खोकी लागेको थियो ? ○ थियो ○ थिएन *(यदि थिएन भने प्रश्न नं. ४.६ मा जानुहोस)*
4.1 Has the baby had a cough? Yes No *(If no, go to question no. 4.6)*

४.२ कति दिन सम्म लगातार खोकी लाग्यो ? ☐☐ दिन
4.2 For how many days continuously did the cough last? days

४.३ बच्चाले ६ घण्टा भन्दा बढी छिटो छिटो सास फेरेको थियो ? ○ थियो ○ थिएन
4.3 Has the baby had fast breathing for more than 6 hours? Yes No

४.४ बच्चाको कोखा हानेको देख्नु भयो ? ○ देखें ○ देखिन ○ थाहा छैन
4.4 Has the baby had chest recession? Yes No Don't know

४.५ बच्चालाई दूध खान गाह्रो पर्‍यो ? ○ पर्‍यो ○ परेन
4.5 Has the baby had difficulty feeding? Yes No

४.६ दिनको ३ पटक भन्दा बढि बच्चालाई पखाला लागेको थियो ? ○ थियो ○ थिएन
4.6 Has the baby had diarrhoea more than 3 times a day? Yes No

(यदि थिएन भने प्रश्न नं. ४.१० मा जानुहोस)
(If no, go to question no. 4.10)

४.७ कति दिन सम्म पखाला लागेको थियो ? ☐☐ दिन
4.7 For how many days did the diarrhoea last? days

४.८ दिशामा आउँ, पिप रगत देखिएको थियो ? ○ थियो ○ थिएन ○ थाहा छैन
4.8 Was there mucus, pus or blood in the stool? Yes No Don't know

४.९ बच्चाले बारम्बार बान्ता गरेको थियो ? ○ थियो ○ थिएन
4.9 Has the baby been vomiting repeatedly? Yes No

४.१० बच्चालाई बढी ज्वरो आएको थियो ? ○ थियो ○ थिएन *(यदि थिएन भने प्रश्न नं. ५.१ मा जानुहोस)*
4.10 Has the baby had a high fever? Yes No *(If no, go to question no. 5.1)*

४.११ कति दिन सम्म ☐☐ दिन
4.11 For how many days days

(यदि माथिका प्रश्नहरुमा कुनै बिरामहरु छैन भने अन्तर्वार्ता रोक्नुहोस)
(If there was no illness in the above questions, stop the interview)

५ बच्चाको स्वास्थ्य स्याहार Treatment of the baby

5

(यदि बच्चालाई खोकी, झाडा पखाला र ज्वरो आएको छ भने तलको प्रश्नहरु सोध्नुहोस)
(if the baby had cough, diarrhoea or fever, ask the following questions)

धामी
Dhaami

५.१ तपाई वा परिवारका सदस्यहरुले बच्चा बिरामी हुँदा उपचार गर्नलाई धामी कहाँ देखाउन जानु भयो ?
5.1 When the baby was sick, did you or your family go to the Dhaami for any treatment?

○ गए Yes ○ गइन No

स्वास्थ्य संस्थामा
Health service

५.२ तपाई वा परिवारका सदस्यहरुले बच्चा बिरामी हुँदा उपचार गर्नलाई स्वास्थ्य संस्थामा लैजानु भयो ?
5.2 When the baby was sick, did you or your family go to the health services for any treatment?

○ लगें Yes ○ लगिन No

(यदि लगिन भने प्रश्न नं. ५.७ मा जानुहोस)
(if no, go to question 5.7)

५.३ कहाँ जचाउन जानु भएको थियो ?
5.3 Where did you go for the consultation?

☐ अस्पताल Hospital
☐ प्रा. स्वा. के. Primary Health Centre
☐ स्वा. चौ. Health Post
☐ उप-स्वा.चौ. Sub Health Post
☐ गाउँघर क्लिनिक Mobile clinic
☐ परिवार नियोजन क्लिनिक Family Planning clinic
☐ प्राइभेट क्लिनिक Private clinic
☐ औषधी पसल Medicine shop
☐ अन्य ..... Other

५.४ को संग उपचार गराउनु भयो ?
5.4 Who did you get treatment from?

☐ डाक्टर Doctor
☐ नर्स Nurse
☐ अ. न. मी. ANM
☐ हे.अ.÷नर्स.अ.हे.ब.÷अ.हे.ब.÷सि.एम.ए. HA/SAHW/AHW/CMA
☐ तालीम प्राप्त सुडेनी Trained TBA
☐ तालीम नपाएको सुडेनी Untrained TBA
☐ मात् शिशु स्वास्थ्य कार्यकर्ता MCHW
☐ ग्रामिण स्वास्थ्य कार्यकर्ता VHW
☐ महिला स्वास्थ्य स्वय्म सेवीका FCHV
☐ औषधी पसले Medicine shopkeeper
☐ थाहा छैन Don't know
☐ अन्य ..... Other

५.५ कसरी त्यहाँ (पुगाइयो) पुग्नु भयो ?
5.5 How did you get there?

☐ हिंडेर Walked ☐ गाडामा Cart ☐ एम्बुलेन्स Ambulance ☐ गाडी÷टेम्पो÷बस÷रिक्सा Car/tempo/bus/rickshaw

५.६ बिरामी भएको कति समयपछि त्यहां पुग्नु भयो ?
5.6 How long after the baby became ill did you arrive there?

☐☐ घण्टा पछि Hours वा or ☐☐ दिन पछि Days after

उपचार
Treatment

५.७ बच्चा बिरामी हुंदा कुनै प्रकारको उपचार दिनु भएको थियो ?
5.7 When the baby was ill, did you give any sort of medi cine?

○ थियो Yes ○ थिएन No

(यदि थिएन भने अन्तर्वार्ता रोक्नुहोस)
(if no, stop the interview)

५.८ बच्चालाई के दिनु भएको थियो ?
5.8 What did you give?

○ औषधि Allopathic medicine ○ घरेलु औषधि उपचार Traditional medicine ○ औषधि र घरेलु औषधि उपचार Allopathic and traditional medicine
○ अन्य ..... Other

५.९ बिरामी भएको कति समय पछि उपचार गर्नु भएको थियो ?
5.9 How long after the baby became ill did you give the medicine?

☐☐ घण्टा पछि Hours after वा or ☐☐ दिन पछि Days after वा or ☐☐ हप्ता पछि Weeks after

मिरा मकवानपुर

मातृ तथा नवजात शिशु स्याहार कार्यक्रम

जन्मेको १ महिना भित्र मरेको शिशु

Perinatal verbal autopsy questionnaire

घरधुरी परिचय

Household ID no.

गा. वि. स. नं. ☐☐ (VDC no.) वडा नं. ☐ (Ward no.)

टोल ..... (Tole)

क्षेत्र नम्बर ☐ (Sector no.) घरधुरी संख्या ☐☐☐ (Household no.)

अन्तर्वार्ता लिएको मिति (Interview date)

☐☐ गते (day) ☐☐ महिना (month) ☐☐ साल (year)

अन्तर्वार्ता लिनेको परिचय संख्या ☐☐☐ (Interviewer no.)

MWRA को नाम ..... (MWRA name)

MWRA को परिचय संख्या ☐☐ ☐☐ ☐☐☐ ☐ (MWRA ID no.)

शिशुको नाम ..... (Infant name)

उत्तर दिने व्यक्तिको नाम ..... (Respondent name)

उत्तर दिने व्यक्तिको शिशु संगको सम्बन्ध (Relation of respondent to infant)

☐ आमा (Mother) ☐ बुवा (Father) ☐ मामा तर्फको परिवार (Mother's family)

☐ बुबा तर्फको परिवार (Father's family) ☐ अन्य ..... (Other)

१ लिखित बिवरण

1 Written description

१.१ हामीलाई मद्दत गर्न राम्ररी बुझ्ने गरी कसरी र किन बच्चाको मृत्यु भयो, कृपया सबै घटनाक्रमहरु शुरु देखि मृत्युभएसम्मको बताइदिनुहोस् । कृपया शुरु देखि सबै कुरा भन्नुहोस उनीलाई के भएको थियो र के कस्तो समस्याहरु आएको थियो ।

कृपया भन्नुहोस कि कसरी बच्चा बिरामी भयो र मृत्यु भयो ...

1.1 In order to help, we need to understand how and why the baby died, so please tell me all the problems from the beginning until the baby died. Please tell me everything that happened from the beginning and what sort of problems occurred. Please tell me how the baby became ill and died...

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अब, म बच्चाको बारेमा केही प्रश्नहरु सोध्न जाँदैछु । हामीले जसको बच्चा मरेका थिए उनीहरु सबैलाई सोध्यौं त्यसैले हामीलाई पूर्ण ज्ञान भयो कि के भएको थियो र त्यसमा तपाईको बच्चाको कुरा पनि राख्न चाहन्छु ।

Now I am going to ask you some questions about the baby. We ask these questions about all babies who died so that we can get a clear idea about what happened, so we need information about your baby as well.

२ शिशु जन्मेको समयमा

2 At the time of birth

२.१ बच्चा कहिले जन्मेको थियो ? — ☐☐ गते (day) ☐☐ महिना (month) ☐☐ साल (year)
2.1 When was the baby born?

२.२ बच्चा छोरा थियो कि छोरी थियो ? — ○ छोरा (Boy) ○ छोरी (Girl)
2.2 Was the baby a boy or a girl?

२.३ कति महिनाको गर्भवती हुँदा बच्चा जन्मियो ? — ☐☐ महिना (months)
2.3 After how many months of pregnancy was the baby born?

२.४ जन्मेको समयमा बच्चा हेर्दा कस्तो देखिन्थ्यो ? — ○ सामान्य (Normal) ○ असामान्य (Abnormal)
2.4 How did the baby look at birth?

(यदि सामान्य थियो भने प्रश्न नं. २.६ मा जानुहोस)
(If normal, go to question no. 2.6)

२.५ असामान्य भए लेख्नुहोस .....
2.5 If abnormal, describe

२.६ बच्चाको आकार कस्तो थियो ? — ○ धेरै सानो (Very small) ○ ठिक (Normal) ○ धेरै ठूलो (Very big)
2.6 How was the baby's size?

२.७ के बच्चा जुम्ल्याहा थियो ? — ○ थियो (Yes) ○ थिएन (No) *(यदि थिएन भने प्रश्न नं. २.९ मा जानुहोस)* *(If no, go to question no. 2.9)*
2.7 Was the baby a twin

२.८ यो बच्चा पहिला वा दोश्रो कहिले जन्मिएको थियो ? — ○ पहिलो (First) ○ दोश्रो (Second) ○ थाहा छैन (Don't know)
2.8 Was this baby born first or second?

२.९ बच्चाको टाउको चेप्टो परेको थियो ? — ○ थियो (Yes) ○ थिएन (No) ○ थाहा छैन (Don't know)
2.9 Was the baby's head squashed?

२.१० बच्चाको शरीरमा निला टाटाहरु थियो ? — ○ थियो (Yes) ○ थिएन (No) ○ थाहा छैन (Don't know)
2.10 Was there bruising on the baby's body?

३ नवजात शिशु स्याहार

3 Newborn care

३.१ बच्चा कहाँ जन्माइएको थियो?

3.1 Where was the baby born?

○ घरमा House ○ गोठमा Shed ○ खेत÷बारी÷जंगल Fields/woods ○ आंगन, पिडि, छत Area around the house

○ अस्पताल Hospital ○ प्राइभेट क्लिनिक Private clinic ○ अन्य Other .....

३.२ सुत्केरी कोठालाई आगो÷स्टोभ अथवा अन्य साधनले कहिले तताइएको थियो ?

3.2 Was there a fire, stove or other form of heating in the delivery room?

○ बच्चा जन्मनु भन्दा अगाडी Before the baby was born ○ बच्चा जन्मि सके पछि After the baby was born

○ बच्चा जन्मनु भन्दा अगाडी र पछि Before and after the baby was born ○ थिएन No

३.३ सुत्केरी हुंदा कस्ले सहयोग गऱ्यो ?

3.3 Who helped with the delivery?

☐ डाक्टर Doctor ☐ नर्स Nurse ☐ अ. न. मी. ANM

☐ हे.अ.÷सि.अ.हे.ब.÷अ.हे.ब.÷सि.एम.ए. HA/SAHW/AHW/CMA ☐ तालीम प्राप्त सुडेनी Trained TBA ☐ तालीम नपाएको सुडेनी Untrained TBA

☐ मातृ शिशु स्वास्थ्य कार्यकर्ता MCHW ☐ ग्रामिण स्वास्थ्य कार्यकर्ता VHW ☐ महिला स्वास्थ्य स्वयम् सेवीका FCHV

☐ सासु Mother-in-law ☐ परिवारका सदस्य Family member ☐ छिमेकी÷साथी Neighbour/friend

☐ आफै (कोही पनि नभएको) Alone (nobody helped) ☐ अन्य Other .....

(यदि कसैले मद्दत गरेको थिएन भने प्रश्न नं. ३.५ मा जानुहोस)

(If nobody helped, go to question no. 3.5)

३.४ सहयोग गर्ने मानिसले हात धोएको थियो ?

3.4 Did the person who helped wash her hands?

○ थियो Yes ○ थिएन No ○ थाहा छैन Don't know

३.५ यो के हो ? चिन्नु हुन्छ ? *(सुत्केरी सामग्री देखाउने)*

3.5 Do you know what this is? *(Show a Clean Home Delivery Kit)*

○ चिन्छु Yes ○ चिन्दिन No

(यदि चिन्दैन भने प्रश्न नं. ३.७ मा जानुहोस)

(If she does not know, go to question no. 3.7)

३.६ सुत्केरी सामाग्री प्रयोग गर्नु भयो ?

3.6 Did you use a Clean Home Delivery Kit?

○ गरे Yes ○ गरिन No

३.७ बच्चा जन्मदा जिउँदो जन्मियो कि मरेको जन्मियो ?

3.7 Was the baby born alive or dead?

○ मरेको Dead ○ जिउँदो Alive

(यदि जिउँदो भने प्रश्न नं. ४.१ मा जानुहोस)

(If the baby was born alive, go to question no. 4.1)

Stillbirth

३.८ तपाईलाई प्रसव व्यथा लाग्नु अगाडि नै बच्चा चल्न छोडेको थियो ?

3.8 Had the baby stopped moving before you went into labour?

○ थियो Yes ○ थिएन No

(यदि थियो भने प्रश्न नं. ३.११ मा जानुहोस)

(If yes, go to question no. 3.11)

३.९ तपाईको बिचारमा त्यो बच्चा प्रसव व्यथा लाग्नु अगाडि नै मरिसकेको थियो ?

3.9 Do you think that the baby had died before you went into labour?

○ थियो Yes ○ थिएन No

(यदि थियो भने प्रश्न नं. ३.११ मा जानुहोस)

(If yes, go to question no. 3.11)

३.१० कहिलेकाही बच्चाहरु जन्मन्छन र मर्छन, तर जन्मेको केहीबेरमै उनीहरुले केही चल्छन जस्तै उनीहरु हात वा खुट्टा चलाउन्छन वा तपाईले धेरै छोटो समय सम्म सास लिइएको देख्न सक्नु हुन्छ। तपाईले बच्चा चलेको वा धेरै छोटो समय सम्म बराबर सास फेरेको देख्नु भयो ?

3.10 Sometimes babies are born and then die, or after being born they move a little, for example they move their hands or feet or you see them breathing for a very short time. Did see your baby moving or breathing for a very short time?

○ देखें Yes ○ देखिन No

(यदि देखे भने प्रश्न नं. ४.१ मा जानुहोस)

(If yes, go to question no. 4.1)

३.११ बच्चाको शरीर हेर्दा जिउँदो बच्चाको जस्तै देखिन्थ्यो, वा कुनै रुपमा फरक देखिन्थ्यो ?

3.11 When you looked at the baby, did her body look like the body of a normal baby, or had it changed in some way?

○ जिउँदो बच्चा जस्तै Like a living baby ○ फरक Different

(अब, अन्तर्वार्ता रोक्नुहोस)

(Now stop the interview)

यदि जन्मेको केही छिन पछि नै बच्चा मरेको भए प्रश्न नं ६.१ मा जानुहोस् ।
If the baby died only a few moments after birth, go to question no. 6.1

४ जन्मेर मरेको बच्चा
4 A baby who died after birth

४.१ नाल के ले काट्नु भयो ?
4.1 What was the cord cut with?

○ उमालेको पत्तीले (Boiled blade) ○ नउमालेको पत्तीले (Unboiled blade) ○ चक्कु÷छुरी÷कैंचि (Knife) ○ हसिया ÷ खुर्पा (Sickle/woodknife)
○ बाँसले (bamboo stick) ○ थाहा छैन (Don't know) ○ अन्य ..... (Other)

४.२ नाभी काटि सके पछि के लगाउनु भयो ?
4.2 What was put on the cord after it was cut?

○ तेल (Oil) ○ बेसार (Turmeric) ○ नधोएको कपडा वा कपास (Unwashed cloth) ○ धोएको कपडा वा कपास (Washed cloth)
○ औषधि, डेटोल (Medicine/Dettol) ○ पाउडर (Powder) ○ माटो (Mud) ○ केहि नराखेको (Nothing)
○ थाहा छैन (Don't know) ○ अन्य ..... (Other)

४.३ बच्चालाई कस्तो कपडाले बेरिएको थियो ? ○ नयां कपडा (New cloth) ○ पुरानो कपडा (Old cloth) ○ थाहा छैन (Don't know)
4.3 What sort of cloth was the baby wrapped in?

४.४ बच्चालाई बेर्ने कपडा धोएको थियो ? ○ थियो (Yes) ○ थिएन (No) ○ थाहा छैन (Don't know)
4.4 Had the cloth been washed?

४.५ बच्चा जन्मिएको कति बेर पछि बच्चालाई कपडाले बेरिएको थियो ? ☐☐ मिनेट पछि (Minutes after) वा (or) ☐☐ घण्टा पछि (Hours after)
4.5 How long after birth was the baby wrapped up?

४.६ जन्मिएको कति समय पछि बच्चालाई नुहाउनु भयो ? ☐☐ मिनेट पछि (Minutes after) वा (or) ☐☐ घण्टा पछि (Hours after) वा (or) ☐☐ दिन पछि (Days after)
4.6 How long after birth was the baby bathed?

४.७ बच्चालाई पहिलो पटक के खान दिइयो ?
4.7 What was the first food given to the baby?

○ आमाको दुध (Breastmilk) ○ अरु आमाको दुध (Other woman's milk) ○ गाई÷भैसिको दुध (Cow/buffalo milk) ○ ल्याक्टोजेन (Formula)
○ दुध खाना (Milk food) ○ घ्यु (Ghee) ○ घ्यु र चिनी (Ghee and sugar) ○ घ्यु र मह (Ghee and honey)
○ चिनी (Sugar) ○ मह (Honey) ○ तेल (Oil) ○ थाहा छैन (Don't know)
○ अन्य ..... (Other)

४.८ बच्चा जन्मिसकेपछि माइती जानुभयो ? ○ गए (Yes) ○ गइन (No) *(यदि गइन भने प्रश्न नं. ४.११ मा जानुहोस्) (If no, go to question no. 4.11)*
4.8 Did you go to your maiti after the birth?

४.९ जन्मेको कति पछाडि जानुभयो ? ○ पहिलो हप्तामै (In the first week) ○ १ हप्ता देखि १ महिना भित्र (Between 1 week and 1 month) ○ १ महिना पछि (After 1 month)
4.9 How long after the birth did you go there?

४.१० कति समयसम्म त्यहां बस्नु भयो ? ○ १ हप्ता सम्म (Up to 1 week) ○ १ हप्ता देखि १ महिना सम्म (Between 1 week and 1 month) ○ १ महिना भन्दा बढी (Over 1 month)
4.10 How long did you stay there?

४.११ त्यहाँ सम्म पुग्न कति समय लाग्छ ? ☐☐ घण्टा (Hours) वा (or) ☐☐ दिन (Days)
4.11 How long does it take to get there?

४.१२ तपाईको बच्चालाई बि. सि. जि. खोप दिई सक्नु भयो ? ○ दियो (Yes) ○ दिएको छैन (No) ○ थाहा छैन (Don't know)
4.12 Did your baby have the BCG immunisation?

५ आमाको दुध

5 Breastfeeding

५.१ तपाईले आफ्नो बच्चालाई आमाको दूध खुवाउनु भएको थियो ? ○ खुवाए ○ खुवाइन
5.1 Did you breastfeed your baby? Yes No

(यदि दूध नखुवाएको हो भने प्रश्न नं. ६.१ मा जानुहोस)
(If no, go to question no. 6.1)

५.२ बच्चा जन्मिएको कति बेर पछि आमाको दुध चुसाउनु भयो? ☐☐ मिनेट पछि वा ☐☐ घण्टा पछि वा ☐☐ दिन पछि
5.2 How long after the birth did you first feed the baby? Minutes after or Hours after or Days after

५.३ बच्चालाई पहिलो पटक दुध खुवाउनु भन्दा अगाडी दुध निचोरेर फाल्नु भयो? ○ फालें ○ फालिन
5.3 Did you throw away any milk before the first time you fed the baby? Yes No

५.४ प्रत्येक पटक दुध खुवाउदा दुध निचोरेर फाल्ने गर्नु हुन्थ्यो ? ○ फाल्थे ○ फाल्दिन थिए
5.4 Did you throw away any milk before each time you fed the baby? Yes No

५.५ आमाको दूध बाहेक पाउडरको दूध वा अन्य दूध बच्चालाई खुवाउने गर्नु भएको थियो ? ○ थियो ○ थिएन
5.5 Apart from breastmilk, did you give your baby powdered milk or another type of milk? Yes No

(यदि खुवाएको थिएन भने प्रश्न नं. ५.७ मा जानुहोस)
(If no, go to question no. 5.7)

५.६ जन्मेको कति हप्ता पछि खुवाउन शुरु गर्नु भएको थियो ? ☐ हप्ता पछि
5.6 How many weeks after the birth did you start? weeks after

५.७ आमाको दूध बाहेक बच्चालाई दिनहुँ सादा पानी खुवाउने गर्नु भएको थियो ? ○ थियो ○ थिएन
5.7 Apart from breastmilk, did you give your baby water? Yes No

(यदि खुवाएको थिएन भने प्रश्न नं. ५.९ मा जानुहोस)
(If no, go to question no. 5.9)

५.८ जन्मेको कति हप्ता पछि खुवाउन शुरु गर्नु भएको थियो ? ☐ हप्ता पछि
5.8 How many weeks after the birth did you start? weeks after

५.९ आमाको दूध बाहेक बच्चालाई दिनहुँ अरु झोल पदार्थ पनि खुवाउने गर्नु भएको थियो ? ○ थियो ○ थिएन
5.9 Apart from breastmilk, did you give your baby other liquids? Yes No

(यदि खुवाएको थिएन भने प्रश्न नं. ५.११ मा जानुहोस)
(If no, go to question no. 5.11)

५.१० जन्मेको कति हप्ता पछि खुवाउन शुरु गर्नु भएको थियो ? ☐ हप्ता पछि
5.10 How many weeks after the birth did you start? weeks after

५.११ आमाको दूध बाहेक अरु कुनै ठोस वा नरम खाना पनि दिनहुँ खुवाउने गर्नु भएको थियो ? ○ थियो ○ थिएन
5.11 Apart from breastmilk, did you give your baby solids? Yes No

(यदि खुवाएको थिएन भने प्रश्न नं. ५.१३ मा जानुहोस)
(If no, go to question no. 5.13)

५.१२ जन्मेको कति हप्ता पछि खुवाउन शुरु गर्नु भएको थियो ? ☐ हप्ता पछि
5.12 How many weeks after the birth did you start? weeks after

५.१३ बच्चालाई बोतलबाट केहि खानेकुरा खुवाइएको थियो ? ○ थियो ○ थिएन
5.13 Did you give any of these things from a bottle? Yes No

६ बच्चा जन्मेको केहिबेर पछिका प्रश्नहरु

6 Questions about the baby a few moments after birth

६.१ बच्चा कहिले मरेको थियो ? ☐☐ गते ☐☐ महिना ☐☐ साल
6.1 When did the baby die? day month year

६.२ बच्चा जन्मिएको केहि मिनेटमै तपाईले बच्चालाई कुनै प्रकारको खराब भएको महशुस गर्नु भयो ? ○ गरे ○ गरिन
6.2 Within a short time after birth, did younotice any problem in the baby? Yes No

६.३ बच्चा जन्मने बित्तिकै कस्तो प्रकारले रोयो ?
6.3 What was the baby's crying like just after birth?
○ रुदै नरोएको (No cry) ○ मसिनो (Weak cry) ○ सानो तिखो स्वरले (Normal cry) ○ थाहा छैन (Don't know)

६.४ बच्चा जन्मदा रङ्ग कस्तो थियो ?
6.4 What was the baby's colour like just after birth?
○ फुस्रो÷सेतो (Pale/white) ○ निलो÷खरानी (Blue) ○ गुलाबी रङ्ग (Pink) ○ थाहा छैन (Don't know)

६.५ जन्मेको समयमा बच्चा कस्तो थियो ?
6.5 How was the baby at the time of birth? ○ टाठो (Alert) ○ सुस्त (Drowsy) ○ थाहा छैन (Don't know)

६.६ बच्चा जन्मदा लल्याक लुलुक थियो ?
6.6 Was the baby floppy at the time of birth? ○ थियो (Yes) ○ थिएन (No) ○ थाहा छैन (Don't know)

६.७ बच्चाको हात खुट्टा भांचिएको वा पक्षघात भएको थियो ?
6.7 Did the baby have a broken or paralysed arm or leg? ○ थियो (Yes) ○ थिएन (No)

७ बच्चाको श्वास प्रश्वास सम्बन्धी प्रश्नहरु
7 Questions about the baby's breathing

७.१ बच्चाको श्वास प्रश्वासमा कहिल्यै गाह्रो भएको थियो ? ○ थियो (Yes) ○ थिएन (No)
7.1 Did the baby ever have difficulty breathing?

(यदि थिएन भने प्रश्न नं. ८.१ मा जानुहोस)
(If no, go to question no. 8.1)

७.२ बच्चाको श्वास प्रश्वासमा के गाह्रो भएको थियो ?
7.2 What sort of difficulty did the baby have?

○ रोकी रोकी सास फेर्ने (Intermittent breathing) ○ छिटो छिटो सास फेर्ने (Fast breathing) ○ थाहा छैन (Don't know)

७.३ कहिले बच्चालाई पहिलाचोटी श्वास प्रश्वासमा समस्या भएको थियो ?
7.3 When did the baby first start to have the breathing problem?

○ जन्मने बित्तिकै (Immediately at birth) ○ तुरुन्तै होइन तर श्वास प्रश्वासमा गाह्रो भएको (Not at once but within 6 hours of birth) ○ ६ घण्टा पछि श्वास प्रश्वासमा गाह्रो भएको (More than 6 hours after birth)

७.४ कति बेर सम्म श्वास प्रश्वासमा गाह्रो भएको थियो ? ☐☐ घण्टा (hours) वा (or) ☐☐ दिन (days)
7.4 How long did the breathing difficulty continue?

७.५ बच्चा नमरेसम्म श्वास प्रश्वासमा गाह्रो भएको थियो ? ○ थियो (Yes) ○ थिएन (No)
7.5 Did the breathing problem continue until the baby died?

७.६ के तपाईले कोखा हानेको देख्नु भएको थियो ? ○ थियो (Yes) ○ थिएन (No) ○ थाहा छैन (Don't know)
7.6 Did you see any recession?

७.७ बच्चाले आवाज निकाल्दै रोकी रोकी सास फेरेको थियो ? ○ थियो (Yes) ○ थिएन (No) ○ थाहा छैन (Don't know)
7.7 Did the baby make a sound like a gasp while breathing?

७.८ बच्चाको अनुहार र ओंठ हेर्दाखेरि निलो देखिन्थ्यो ? ○ देखिन्थ्यो (Yes) ○ देखिदैन थियो (No) ○ थाहा छैन (Don't know)
7.8 Did the baby's face and lips look blue?

७.९ बच्चालाई खोकी लागेको थियो ? ○ थियो (Yes) ○ थिएन (No)
7.9 Did the baby have a cough?

७.१० बच्चाको अवस्था खराब हुनु अगाडि दूध खुवाउँदा सर्केको वा लगातार खोकी लागेको थियो ? ○ थियो (Yes) ○ थिएन (No)
7.10 Before the baby became ill, did she choke on a feed?

८ बच्चाको खानाको प्रश्नहरु
8 Questions about the baby's feeding

८.१ बच्चालाई खुवाउँदा कहिल्यै गाह्रो भएको थियो ? ○ थियो (Yes) ○ थिएन (No)
8.18 Did the baby ever have difficulty feeding?

(यदि थिएन भने प्रश्न नं. ९.१ मा जानुहोस)
(If no, go to question no. 9.1)

८.२ बच्चालाई कहिले देखि समस्या शुरु भयो ? ○ बच्चा ३ दिन हुनु भन्दा अगाडि (Before 3 days old) ○ बच्चा ३ दिन भए पछि (After 3 days old)
8.2 From when did the baby have difficulty feeding?

८.३ बच्चालाई खाना खुवाउने समस्या कति दिनसम्म भएको थियो ? ☐☐ दिन (days)
8.3 How long did the feeding difficulty continue?

८.४ बच्चा नमरेसम्म खाना खुवाउन समस्या भएको थियो ? ○ थियो (Yes) ○ थिएन (No)
8.4 Did the feeding difficulty continue until the baby died?

८.५ बच्चालाई धनुषटंकार रोग लागेको थियो ? ○ थियो (Yes) ○ थिएन (No) ○ थाहा छैन (Don't know)
8.5 Did the baby have tetanus?

८.६ बच्चाले मुख खोल्न सक्थ्यो ? ○ सक्थ्यो (Yes) ○ सक्दैन थियो (No)
8.6 Could the baby open her mouth?

८.७ बच्चाले शरीर तन्काउने र पछाडिबाट बांगिने भएको थियो ? ○ थियो (Yes) ○ थिएन (No)
8.7 Did the baby's body go stiff and arch with spasms?

८.८ बच्चाको नाभी वरिपरि रातो डाम देखिएको थियो ? ○ थियो (Yes) ○ थिएन (No)
8.8 Was there a red ring around the baby's umbilicus?

९ बच्चाको दिसाको बारेमा प्रश्नहरु
9 Questions about the baby's stools

९.१ बच्चाले दिनको ३ पटक भन्दा बढी पातलो दिसा गरेको थियो ? ○ थियो ○ थिएन
9.1 Did the baby ever have diarrhoea more than 3 times a day? Yes No
(यदि थिएन भने प्रश्न नं. १०.१ मा जानुहोस)
(If no, go to question no. 10.1)

९.२ दिसामा आउँ, रगत देखिएको थियो ? ○ थियो ○ थिएन ○ थाहा छैन
9.2 Was there mucus or blood in the stool? Yes No Don't know

९.३ बच्चालाई कति पटक खाना खान दिनु भयो ?
9.3 How much did you feed the baby?
○ अघि पछिको भन्दा कम Less than usual ○ सधैंको जस्तै As usual ○ सधैंको भन्दा बढी More than usual

९.४ बच्चाको आँखा दबिएको थियो ? ○ थियो ○ थिएन ○ थाहा छैन
9.4 Were the baby's eyes sunken? Yes No Don't know

९.५ टाउको को तालु कस्तो देखिन्थ्यो ? ○ धेरै दबिएको Very sunken ○ ठिकै Normal ○ माथि उठेको Bulging up ○ थाहा छैन Don't know
9.5 How did the fontanelle look?

९.६ बच्चाको पिसाब कस्तो रङ्को थियो ? ○ धेरै फिका Very light ○ ठिकै Normal ○ धेरै गाढा Very dark ○ थाहा छैन Don't know
9.6 What colour was the baby's urine?

९.७ कति पिसाब गरेको थियो ? ○ धेरै कम Very little ○ ठिकै Normal ○ सधैंको भन्दा बढी More than usual ○ थाहा छैन Don't know
9.7 How much urine did the baby pass?

९.८ बच्चाले पटक पटक बान्ता गरेको थियो ? ○ थियो ○ थिएन
9.89. Did the baby vomit over and over again? Yes No

१० बच्चाको बारेमा अन्तिम प्रश्नहरु
10 Final questions about the baby

१०.१ बच्चालाई ज्वरो आएको थियो ? ○ थियो ○ थिएन
10.1 Did the baby have a fever? Yes No

१०.२ बच्चाको पेट फुलेको थियो ? ○ थियो ○ थिएन
10.2 Was the baby's stomach distended? Yes No

१०.३ अरु बच्चाको दाँजोमा बच्चा पहेंलो देखिन्थ्यो ? ○ देखिन्थ्यो ○ देखिदैन
10.3 Did the baby look yellow compared with other babies? Yes No

१०.४ बच्चालाई कहिल्यै कम्पनहरु आएको थियो ? ○ थियो ○ थिएन
10.4 Did the baby have any fits? Yes No
(यदि थिएन भने प्रश्न नं. १०.६ मा जानुहोस)
(If no, go to question no. 10.6)

१०.५ बच्चा जन्मेको कुन दिनमा ? ☐☐ दिन
10.5 On which day of life? day

१०.६ बच्चाको टाउको, छाती र पेट छाम्दा धेरै चिसो थियो ? ○ थियो ○ थिएन
10.6 Did the baby's head, chest and stomach feel very cold? Yes No
(यदि थिएन भने प्रश्न नं. १०.८ मा जानुहोस)
(If no, go to question no. 10.8)

१०.७ बच्चा मर्नु भन्दा अघि दुई घण्टा भन्दा बढी चिसो भएको थियो ? ○ थियो ○ थिएन
10.7 Did the baby feel cold for more than 2 hours before she died? Yes No

१०.८ के तपाईले बच्चाको छालामा सेतो मसिनो फोका देखिएको थियो ? ○ थियो ○ थिएन
10.8 Were there white spots of pus on the baby's skin? Yes No

१०.९ केहि खराबी हुनु भन्दा अगाडि बच्चा अकस्मात मरेको थियो ? ○ थियो ○ थिएन
10.9 Did the baby suddenly die without being ill before? Yes No

१०.१० बच्चा ३ दिन पछि आधा निन्द्रा वा चल्न नसक्ने भएको थियो ? ○ थियो ○ थिएन
10.10 Did the baby become drowsy and motionless after 3 days of life? Yes No

१०.११ माथि छुलफल गरेको कारण बाहेक अरु फरक कारणले मरेको थियो ? ○ थियो ○ थिएन
10.11 Apart from the questions already asked, did the baby die from any other problem? Yes No
(यदि थिएन भने प्रश्न नं. ११.१ मा जानुहोस)
(If no, go to question no. 11.1)

(यदि थियो भने १.१ मा लेखिएको विवरण संग मिलाएर हेर्नुहोस)
(If yes, make sure that the reason is written in section 1.1)

११ बच्चाको स्वास्थ्य स्याहार Treatment of the baby

11

(तलका प्रश्नहरु त्यस बिमारीको लागी सोध्नुहोस जसको कारण बच्चाको मृत्यु भएको हो)

(Ask the following questions about the illness that led to the baby's death)

धामी

Dhaami

११.१ तपाई वा परिवारका सदस्यहरुले बच्चा बिरामी हुँदा उपचार गर्नलाई धामी कहाँ जानु भएको थियो ?

11.1 When the baby was sick, did you or your family go to the Dhaami for any treatment?

○ गए Yes ○ गइन No

स्वास्थ्य संस्थामा

Health service

११.२ तपाई वा परिवारका सदस्यहरुले बच्चा बिरामी हुँदा उपचार गर्नलाई स्वास्थ्य संस्थामा लैजानु भएको थियो ?

11.2 When the baby was sick, did you or your family go to the health services for any treatment?

○ थियो Yes ○ थिएन No *(यदि थिएन भने प्रश्न नं. ११.७ मा जानुहोस)* *(If no, go to question 11.7)*

११.३ कहाँ जचाउन जानु भएको थियो ?

11.3 Where did you go for the consultation?

☐ अस्पताल Hospital ☐ प्रा. स्वा. के. Primary Health Centre ☐ स्वा. चौ. Health Post

☐ उप-स्वा.चौ. Sub Health Post ☐ गाउँघर क्लिनिक Mobile clinic ☐ परिवार नियोजन क्लिनिक Family Planning clinic

☐ प्राइभेट क्लिनिक Private clinic ☐ औषधी पसल Medicine shop ☐ अन्य ..... Other

११.४ को संग उपचार गराउनु भयो ?

11.4 Who did you get treatment from?

☐ डाक्टर Doctor ☐ नर्स Nurse ☐ अ. न. मी. ANM

☐ हे.अ.÷सि.अ.हे.ब.÷अ.हे.ब.÷सि.एम.ए. HA/SAHW/AHW/CMA ☐ तालीम प्राप्त सुडेनी Trained TBA ☐ तालीम नपाएको सुडेनी Untrained TBA

☐ मातृ शिशु स्वास्थ्य कार्यकर्ता MCHW ☐ ग्रामिण स्वास्थ्य कार्यकर्ता VHW ☐ महिला स्वास्थ्य स्वयम् सेवीका FCHV

☐ औषधी पसले Medicine shopkeeper ☐ थाहा छैन Don't know ☐ अन्य ..... Other

११.५ कसरी त्यहाँ (पुगाइयो) पुग्नु भयो ?

11.5 How did you get there?

☐ हिंडेर Walked ☐ गाडामा Cart ☐ एम्बुलेन्स Ambulance ☐ गाडी÷टेम्पो÷बस÷रिक्सा Car/tempo/bus/rickshaw

११.६ बिरामी भएको कति समयपछि त्यहां पुग्नु भयो ? ☐☐ घण्टा पछि Hours वा or ☐☐ दिन पछि Days after

11.6 How long after the baby became ill did you arrive there?

उपचार

Treatment

११.७ बच्चा बिरामी हुंदा कुनै प्रकारको उपचार लिनु भएको थियो ? ○ थियो Yes ○ थिएन No

11.7 When the baby was ill, did you give any sort of medicine?

(यदि थिएन भने अन्तर्वार्ता रोक्नुहोस) *(If no, stop the interview)*

११.८ बच्चालाई के लिनु भएको थियो ? ○ औषधि Allopathic medicine ○ घरेलु औषधि उपचार Traditional medicine ○ औषधि र घरेलु औषधि उपचार Allopathic and traditional medicine

11.8 What did you give?

○ अन्य ..... Other

११.९ बिरामी भएको कति समय पछि उपचार गर्नु भएको थियो ?

11.9 How long after the baby became ill did you give the medicine?

☐☐ घण्टा पछि Hours after वा or ☐☐ दिन पछि Days after वा or ☐☐ हप्ता पछि Weeks after

APPENDIX C: MIRA MAKWANPUR SURVEILLANCE QUESTIONNAIRES – PHASE II

MIRA, Makwanpur

1

Mother and Newborn Care Programme

SERMI Questionnaire

1. Household ID No.

VDC ☐☐ WARD ☐

Tole.....

Sector ☐ HH No. ☐☐☐

Interviewer ID. ☐☐☐

Interveiw Date

day ☐☐ month ☐☐ year ☐☐

Observed ☐ Checked ☐

Date of Birth :

day ☐☐ month ☐☐ year ☐☐

Name of MW.....

Respondent's Name .....

MW ID ☐☐ ☐☐ ☐☐☐ ☐

a. Have you had ever attended the mothers' group meeting ? O Yes O No

b. How many times ? ☐☐ Times *(if no go to question no. c)*

c. Did you play perinatal picture card game in your tole ? O Yes O No

Religion and Ethnicity

2. What is your ethnic group / caste ?

O Tamang O Magar O Gurung O Newar O Praja O Majhi O Rai (Danuwar) O Bankariya
O Bahun O Chhetri O Thakuri O Sanyasi O Gharti O Kami O Sarki O Damai
O Others.....

3. What is your religion ?

O Hindu O Buddhist O Muslim O Christian O Other.....

(If SERMI Questionnaire has already been asked in this household, go to question number 17 without asking quesion number 4 to 16)

House and Household Possession

4. Is this house your own ? O Yes O No *(If no go to question no. 8)*

5. What the house is made of ?

O Cement & Bricks O Mud & Bricks O Mud & Stone O Planks O Brushwood
O Thatch O Others.....

6. How manay people live in your house ? ☐☐ No/s.

7. How many sleeping rooms are there in your house ? ☐ No/s.

8. Which things do you have in your house ?

a) Electricity O Yes O No b)Radio O Yes O No c)Television O Yes O No
d) Bicycle O Yes O No e) Telephone O Yes O No

9. What type of fuel does your household mainly use for cooking ?

☐ Electricity ☐ LPG ☐ BIOGAS ☐ Kerosene ☐ Coal ☐ Firewood/Straw
☐ Dung ☐ Others.....

10. What is the principle source of drinking water ?

☐ Piped drinking water in residence ☐ Well in residence ☐ Public piped tap
☐ Well with handpump in yard/plot ☐ Public well with handpump ☐ Traditional public well
☐ River,canal or surface water for drinking ☐ Other source of drinking water

11. What is the principal type of toilet facility used by members of your household ? 2

☐ Flush toilet ☐ Use a pan as a latrine ☐ Bush,field as latrine ☐ Pit latrine
☐ VIP latrine ☐ Other type of latrine

12. What is the major occupation of your household ?

○ Agriculture ○ Salaried or Government ○ Small Business ○ Waged labour

13. Do you have your own land ? ○ Yes ○ No *(if no go to question no. 15)*

14. if yes, how much wet land and how much dry upland ?

Wet land ☐☐ Kattha or ☐☐ Bigaha or ☐☐ Ropani

Dry upland ☐☐ Kattha or ☐☐ Bigaha or ☐☐ Ropani

15. How many months of the year does the main occupation support enough food ? ☐☐ Months
(if there is enough for 12 months, go to question no. 17)

16. What do you do to cope with the rest of months ?

○ Agriculture ○ Salary or Govt. Work ○ Small business ○ Waged labour ○ Others.....

Education

17. What is the highest grade did you study ? ☐☐ Class ○ No
(ask to read the sentence)

18. Could you read this Sentence ?

○ Read Easily ○ Read Hardly ○ Can not read

19. How old were you when you got married ? ☐☐ Years

20. Have you used any temproary contraceptive ever before ? ○ Yes ○ No
(if no go to question no. 22)

21. If yes, which one did you use ?

○ Depo ○ Norplant ○ Pills ○ I.U.D ○ Condom ○ Others.....

22. Have you ever had pregnancy before even if it ended early or the baby was a stillbirth ?

○ Yes ○ No
(If no go to question no. 24)

Past Pregnancies

23. Married Woman(MW) full maternity history :- (Now I am going to ask your pregnancies which include born alive, born dead or lost before birth. Please start with the first pregnancy you had)

1 a) Was there multiple pregnancy ? ○ Yes ○ No

☐ Born Dead < 7 months Miscarrage Date of Miscarrage ☐☐ day ☐☐ Month ☐☐ Year
(now go to next baby if there is)

☐ Born Dead > 7 months Stillbirth Date of Stillbirth ☐☐ day ☐☐ Month ☐☐ Year
(now go to next baby if there is)

☐ Born aLive Still Alive Date of Birth ☐☐ day ☐☐ Month ☐☐ Year

Name of Baby..... Sex ○ Boy ○ Girl
(now go to next baby if there is)

☐ Born aLive Now Dead Date of Birth ☐☐ day ☐☐ Month ☐☐ Year

Name of Baby.....

Sex ○ Boy ○ Girl Date of Death ☐☐ day ☐☐ Month ☐☐ Year
(now go to next baby if there is)

2 a) Was there multiple pregnancy ? O Yes O No 3

☐ Born Dead < 7 months Miscarrage Date of Miscarrage ☐☐ day ☐☐ Month ☐☐ Year
(now go to next baby if there is)

☐ Born Dead > 7 months Stillbirth Date of Stillbirth ☐☐ day ☐☐ Month ☐☐ Year
(now go to next baby if there is)

☐ Born aLive Still Alive Date of Birth ☐☐ day ☐☐ Month ☐☐ Year

Name of Baby..... Sex O Boy O Girl
(now go to next baby if there is)

☐ Born aLive Now Dead Date of Birth ☐☐ day ☐☐ Month ☐☐ Year

Name of Baby.....

Sex O Boy O Girl Date of Death ☐☐ day ☐☐ Month ☐☐ Year
(now go to next baby if there is)

3 a) Was there multiple pregnancy ? O Yes O No

☐ Born Dead < 7 months Miscarrage Date of Miscarrage ☐☐ day ☐☐ Month ☐☐ Year
(now go to next baby if there is)

☐ Born Dead > 7 months Stillbirth Date of Stillbirth ☐☐ day ☐☐ Month ☐☐ Year
(now go to next baby if there is)

☐ Born aLive Still Alive Date of Birth ☐☐ day ☐☐ Month ☐☐ Year

Name of Baby..... Sex O Boy O Girl
(now go to next baby if there is)

☐ Born aLive Now Dead Date of Birth ☐☐ day ☐☐ Month ☐☐ Year

Name of Baby.....

Sex O Boy O Girl Date of Death ☐☐ day ☐☐ Month ☐☐ Year
(now go to next baby if there is)

4 a) Was there multiple pregnancy ? O Yes O No

☐ Born Dead < 7 months Miscarrage Date of Miscarrage ☐☐ day ☐☐ Month ☐☐ Year
(now go to next baby if there is)

☐ Born Dead > 7 months Stillbirth Date of Stillbirth ☐☐ day ☐☐ Month ☐☐ Year
(now go to next baby if there is)

☐ Born aLive Still Alive Date of Birth ☐☐ day ☐☐ Month ☐☐ Year

Name of Baby..... Sex O Boy O Girl
(now go to next baby if there is)

☐ Born aLive Now Dead Date of Birth ☐☐ day ☐☐ Month ☐☐ Year

Name of Baby.....

Sex O Boy O Girl Date of Death ☐☐ day ☐☐ Month ☐☐ Year
(now go to next baby if there is)

5 a) Was there multiple pregnancy ? O Yes O No

☐ Born Dead < 7 months Miscarrage Date of Miscarrage ☐☐ day ☐☐ Month ☐☐ Year
(now go to next baby if there is)

☐ Born Dead > 7 months Stillbirth Date of Stillbirth ☐☐ day ☐☐ Month ☐☐ Year
(now go to next baby if there is)

☐ Born aLive Still Alive Date of Birth ☐☐ day ☐☐ Month ☐☐ Year

Name of Baby..... Sex O Boy O Girl
(now go to next baby if there is)

☐ Born aLive Now Dead Date of Birth ☐☐ day ☐☐ Month ☐☐ Year

Name of Baby.....

Sex O Boy O Girl Date of Death ☐☐ day ☐☐ Month ☐☐ Year
(now go to next baby if there is)

6 a) Was there multiple pregnancy ? O Yes O No 4

☐ Born Dead < 7 months Miscarrage Date of Miscarrage ☐☐ day ☐☐ Month ☐☐ Year
(now go to next baby if there is)

☐ Born Dead > 7 months Stillbirth Date of Stillbirth ☐☐ day ☐☐ Month ☐☐ Year
(now go to next baby if there is)

☐ Born aLive Still Alive Date of Birth ☐☐ day ☐☐ Month ☐☐ Year

Name of Baby..... Sex O Boy O Girl
(now go to next baby if there is)

☐ Born aLive Now Dead Date of Birth ☐☐ day ☐☐ Month ☐☐ Year

Name of Baby.....

Sex O Boy O Girl Date of Death ☐☐ day ☐☐ Month ☐☐ Year
(now go to next baby if there is)

7 a) Was there multiple pregnancy ? O Yes O No

☐ Born Dead < 7 months Miscarrage Date of Miscarrage ☐☐ day ☐☐ Month ☐☐ Year
(now go to next baby if there is)

☐ Born Dead > 7 months Stillbirth Date of Stillbirth ☐☐ day ☐☐ Month ☐☐ Year
(now go to next baby if there is)

☐ Born aLive Still Alive Date of Birth ☐☐ day ☐☐ Month ☐☐ Year

Name of Baby..... Sex O Boy O Girl
(now go to next baby if there is)

☐ Born aLive Now Dead Date of Birth ☐☐ day ☐☐ Month ☐☐ Year

Name of Baby.....

Sex O Boy O Girl Date of Death ☐☐ day ☐☐ Month ☐☐ Year
(now go to next baby if there is)

8 a) Was there multiple pregnancy ? O Yes O No

☐ Born Dead < 7 months Miscarrage Date of Miscarrage ☐☐ day ☐☐ Month ☐☐ Year
(now go to next baby if there is)

☐ Born Dead > 7 months Stillbirth Date of Stillbirth ☐☐ day ☐☐ Month ☐☐ Year
(now go to next baby if there is)

☐ Born aLive Still Alive Date of Birth ☐☐ day ☐☐ Month ☐☐ Year

Name of Baby..... Sex O Boy O Girl
(now go to next baby if there is)

☐ Born aLive Now Dead Date of Birth ☐☐ day ☐☐ Month ☐☐ Year

Name of Baby.....

Sex O Boy O Girl Date of Death ☐☐ day ☐☐ Month ☐☐ Year
(now go to next baby if there is)

9 a) Was there multiple pregnancy ? O Yes O No

☐ Born Dead < 7 months Miscarrage Date of Miscarrage ☐☐ day ☐☐ Month ☐☐ Year
(now go to next baby if there is)

☐ Born Dead > 7 months Stillbirth Date of Stillbirth ☐☐ day ☐☐ Month ☐☐ Year
(now go to next baby if there is)

☐ Born aLive Still Alive Date of Birth ☐☐ day ☐☐ Month ☐☐ Year

Name of Baby..... Sex O Boy O Girl
(now go to next baby if there is)

☐ Born aLive Now Dead Date of Birth ☐☐ day ☐☐ Month ☐☐ Year

Name of Baby.....

Sex O Boy O Girl Date of Death ☐☐ day ☐☐ Month ☐☐ Year
(now go to next baby if there is)

10 a) Was there multiple pregnancy ? O Yes O No 5

☐ Born Dead < 7 months Miscarrage Date of Miscarrage ☐☐ day ☐☐ Month ☐☐ Year
(now go to next baby if there is)

☐ Born Dead > 7 months Stillbirth Date of Stillbirth ☐☐ day ☐☐ Month ☐☐ Year
(now go to next baby if there is)

☐ Born aLive Still Alive Date of Birth ☐☐ day ☐☐ Month ☐☐ Year

Name of Baby..... Sex O Boy O Girl
(now go to next baby if there is)

☐ Born aLive Now Dead Date of Birth ☐☐ day ☐☐ Month ☐☐ Year

Name of Baby.....
Sex O Boy O Girl Date of Death ☐☐ day ☐☐ Month ☐☐ Year
(now go to next baby if there is)

Antenatal Care

24.Did you go for check-up during this pregnancy ? O Yes O No *(if yes go to question no. 26)*

25. Why did not you go ?

.....

.....

.....

(Now go to question no. 30)

26. Why did you go for ANC for the first time ?

O For a problem O Just for a check up

27. Where did you go for the check-up ?

☐ Hetauda Hospital ☐ Hospital ☐ P.H.C ☐ Health Post ☐ Sub Health Post
☐ Mobile Clinic ☐ Family Planning ☐ Private Clinic ☐ Medical Shop ☐ Others

28. How may months pregnat were you when you went for first check-up ? ☐☐ Months

29. How many times did you go for a check-up ? ☐☐ Times

T.T and Medicine

30. Did you have T.T injection during this pregnancy ? O Yes O No O Do not know

31. During this pregnancy, were you given or did you buy any iron tablets or iron syrup ? *(Show table/syrup)*

O Given O Bought O Do not know O Didn't take
(if didn't take to question no. 33)

32. During the whole pregnancy for how many days did you take the tables/syrup ?

☐☐☐ days ☐☐ weeks ☐☐ months O Do not know

33. During this pregnancy, were any of the following done at least once ?

a) Were you weighted ? O Yes O No
b) Was your height measured ? O Yes O No
c) Was your blood pressure measured ? O Yes O No
d) Did you give a urine sample ? O Yes O No
e) Did you give a blood sample ? O Yes O No
f) Did a health worker get you to lie down and feel the position of the baby ? O Yes O No
g) Nothing O Yes O No

34. Were you told about signs of pregnancy complication ? O Yes O No O Don't know
(if no or do not know go to question no. 36)

35. Were you told where to go if you had these complication ? O Yes O No O Don't know

Promblems

36. Did you have any problems during pregnancy or after delivery ? O Yes O No
(if no go to question no. 54)

37. What was the problem ?

A. Serious Problems

- ☐ Any vaginal bleeding during pregnancy, before delivery
- ☐ Any vaginal bleeding after delivery, so much you thought you would die
- ☐ Fit/Convulsion : unconscious, jerking arms, legs (not just shivering or shaking)
- ☐ Obstructed labour/ baby stuck
- ☐ Placenta stuck you thought it would not come out
- ☐ Fever, very sick

B. Common minor Problems

- ☐ Headache, Constipation, Nausea, Backache, Weakness, Bloated stomach, Indigestion, Cramps, Itching, diarrohes, Stomach pain, Vaginal discharge, Burning urine
- ☐ Nightblindness
- ☐ Breathlessness doing regular household activities
- ☐ Other.....

38) Did you take treatment for serious problems ? O Yes O No

if no, why not.....
.....
.....

39) Did you take treatment for common minor problems ? O Yes O No

if no, why not.....
.....
.....

40. Who did you consult with at first ?

O Doctor O Staff Nurse O HA O ANM O AHW
O Medical shopkeeper O MCHW O FCHV O TBA O Dhami
O Others

41. Where did you go for treatment ?

☐ Health Institution ☐ Medical shop ☐ Shaman ☐ Call Health worker at home ☐ Other

42. How did you get there ?

☐ Walked ☐ Carried ☐ Ambulence ☐ Car / Tempo / Bus / Rickshaw
☐ Stretcher (MIRA) ☐ Stretcher (Other) ☐ Doko

43. How long after you became ill did you get treatment ? ☐☐ After hour/s or ☐☐ After day/s

44. Did you go to another place after the first place ? O Yes O No *(if no go to question no. 54)*

45. If yes, were you reffered there or did you just go ? ○ Reffered ○ Just go

46. Where did you go ?

☐ Health Institution ☐ Medical shop ☐ Shaman ☐ Call Health worker at home ☐ Other

47. How did you get there ?

☐ Walked ☐ Carried ☐ Ambulence ☐ Car / Tempo / Bus / Rickshaw

☐ Stretcher (MIRA) ☐ Stretcher (Other) ☐ Doko

48. How much did you paid in total for transportation and treatment ? Rs.....

49. How did you get money ?

☐ Wages Rs.....

☐ Saving Rs.....

☐ Sale of Land Rs.....

☐ Sale of Livestock Rs.....

☐ Borrowed money from relatives Rs.....

☐ Borrowed money from Lender Rs.....

☐ Borrowed money from MCH Fund (MIRA) Rs.....

☐ Borrowed money from Other Fund Rs.....

50. Did you have check-up after delivery ? ○ Yes ○ No *(if no go to question no. 54)*

51. If yes, when did you go ? ☐☐ After day/s

52. Whom did you see ?

○ Doctor ○ Staff Nurse ○ HA ○ ANM ○ AHW

○ Medical shopkeeper ○ MCHW ○ FCHV ○ TBA ○ Dhami

○ Others

53. Have you been given vitamin A capsuls since the delivery ? ○ Yes ○ No

(if there is no living baby stop interview)

Newborn Baby

54. Name of Baby..... Weight ☐.☐☐☐ Kg

55. Date of Birth ☐☐ Day ☐☐ Month ☐☐ Year ○ Son ○ Daughter

56. How many complete months of pregnancy did the baby born ? ☐☐ Months

57. Is the baby twin ? ○ Yes ○ No *(if no go to question no.59)*

58. Was the baby born first or second ? ○ First ○ Second

Newborn Care

59. Where was the baby born ?

○ At home ○ Hetauda Hospital ○ Other Hospital ○ P H C ○ H P

○ S H P ○ Private clinic ○ Medical Shop ○ Area around home ○ Field / Jungle

○ Shed ○ Others..... *(for hospital and phc delivery go to question no. 70)*

60. Was there a fire, stove or other form of heating in the delivery room ?

○ Before baby was born ○ After baby was born ○ Before and after baby was born

○ No ○ Don't know

61. Who helped with the delivery ?

☐ Doctor ☐ Nurse ☐ ANM ☐ HA / AHW / CMA
☐ TBA ☐ MCHW ☐ VHW ☐ FCHV
☐ Mother in law ☐ Family Member ☐ Neighbours / Friends ☐ None (Alone)
☐ Others.....

62. Did the person who helped, have washed his/her hands ?

○ Yes ○ No ○ Don't know

63. Do you know what is this ? *(Show delivery kit)* ○ Yes ○ No *(if no go to question no.66)*

64. Did you use this ? ○ Yes ○ No *(if no go to question no.66)*

65. If yes, which one did you use ? ○ MCH Product ○ Mother's Group Product

66. What was the cord cut with ?

○ Boild Blade ○ Unboiled Blade ○ knife / scissors ○ Sickle / woodknife ○ Bamboo
○ Don't know ○ Others.....

67. What was put on the cord stump after it was cut ?

○ Oil ○ Turmeric ○ Unwashed cloth / cotton ○ Washed cloth / cotton ○ Medicin /dettole
○ Powder ○ Mud ○ Nothing ○ Don't know ○ Other.....

68. How long after birth was the baby wrapped up ?

☐☐ After minutes or ☐☐ After hour/s

69. How long after birth was the baby bathed ?

☐☐ After minutes or ☐☐ After hour/s or ☐☐ After day/s

70. What was the first food given to the baby ?

○ Mother's milk ○ Other mother's milk ○ Cow /buffalo milk ○ Furmola/ Lactozine
○ Milk food ○ Ghee/Sugar/ Honey ○ Oil ○ Don't know
○ Others.....

71. Has your baby had the BCG immunization ? ○ Yes ○ No ○ Don't know

Breastfeeding

72. Have you breastfeed your baby ? ○ yes ○ No *(If no go to question no. 75)*

73. How long after the birth did you first feed the baby ?

☐☐ After minutes or ☐☐ After hour/s or ☐☐ After day/s

74. Did you throw first milk before you feed the baby first ? ○ Yes ○ No

75. Are you feeding the baby only mother's milk or are you giving some other things like : water, lactogen, cow's/buffalo milk as well ?

○ Mother's milk ○ Other things too

Illness in Infant

76. Has the baby had caugh ? ○ Yes ○ No *(if no go to question no. 78)*

77. How many days continuously did the caugh last ? ☐ Day/s

78. Has the baby had fast breathing for more than 6 hours ? ○ Yes ○ No

79. Has the baby had chest recession ? O Yes O No O Don't know

80. Has the baby had difficulty in feeding ? O Yes O No

81. Has the baby had diarrhoea more than 3 times a day ? O Yes O No
(if no go to question no. 83)

82. For how many day did the diarrhoea last ? ☐ Day/s

83. Was there mucus, pus or blood in the stool ? O Yes O No O Don't know

84. Did the baby vomitted repeatedly ? O Yes O No

85. Has the baby had a high fever ? O Yes O No *(if no go to question no. 87)*

86. How many days did the fever last ? ☐ Day/s

87. Has the baby had infection in umbilical cord ? O Yes O No

88. Has the baby had jaundice ? O Yes O No

89. Has the baby had any other illness that you are worried about ?
O Yes O No
(if there is no any illness in this section , stop interview)

if yes,.....
.....
.....

Treatment of the baby

(if baby had fever, diarrhoea, jaundice, cord infection and caughing ask the following questions)

90. Did you seek treatment when the baby was sick ?
O Yes O No *(if yes go to question no. 92)*

91. if not,why did not you go ?
.....
.....
.....

92. Who did you consult with at first ? *(stop interview)*

O Doctor O Staff Nurse O HA O ANM O AHW
O Medical shopkeeper O MCHW O FCHV O TBA O Dhami
O Others

93. How did you get there ?

☐ Walked ☐ Carried ☐ Ambulence ☐ Car / Tempo / Bus / Rickshaw
☐ Stretcher (MIRA) ☐ Stretcher (Other) ☐ Doko

94. Did they treat the baby ? O Yes O No *(if no go to question no. 97)*

95. What did they do ?
.....
.....
.....

96. How long was it from the start of the baby's illness to receive treatment ?
☐☐ After hours or ☐☐ After day or ☐☐ After week

97. Did you then consult anyone else ? O Yes O No *(If No go to 104)*

99. How did you get there ? 10

☐ Walked ☐ Carried ☐ Ambulence ☐ Car / Tempo / Bus / Rickshaw
☐ Stretcher (MIRA) ☐ Stretcher (Other) ☐ Doko

100. Were you reffered or did you just decide to go ? ○ Reffered ○ Just decided to go

101. Did they treat the baby ? ○ Yes ○ No *(if no, go to 103)*

102. What did they do ?

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.....

.....

103. How long was it from the start of the baby's illness to receive treatment ?

☐☐ After hours or ☐☐ After day or ☐☐ After week

104.Did you or your family member give a treatment without consulting anyone else ?

○ Yes ○ No

105. How much did you paid in total for transportation and treatment ? Rs.....

106. How did you get money ?

☐ Wages Rs.....

☐ Saving Rs.....

☐ Sale of Land Rs.....

☐ Sale of Livestock Rs.....

☐ Borrowed money from relatives Rs.....

☐ Borrowed money from Lender Rs.....

☐ Borrowed money from MIRA MCH Fund Rs.....

☐ Borrowed money from Other Fund Rs.....

MIRA, Makwanpur

Mother and Newborn Care Programme

1

Still Birth and Neonatal Verbal Autopsy

1. Household ID No.

VDC ☐☐ WARD ☐

Tole.....

Sector ☐ HH No. ☐☐☐

Interviewer ID. ☐☐☐

Interveiw Date

day ☐☐ month ☐☐ year ☐☐

Observed ☐ Checked ☐

MW ID ☐☐☐☐☐☐☐☐

Name of MW.....

Mother's Status ○ A live ○ Maternal Death

1.Respondent's Name .....

2.Respondent's relationship with the baby.

☐ Mother herself ☐ Father ☐ Father's family member ☐ Mother's family member

☐ Birth attendent ☐ Other (who ?).....

3.Date of Birth : day ☐☐ month ☐☐ year ☐☐

4.Date of Death : day ☐☐ month ☐☐ year ☐☐

5.Baby's Name (if given) .....

6.Sex of Baby ○ Male ○ Female ○ Don't know

7.Where did the baby die ? ○ Home ○ On the way of treatment ○ Health Facility

○ Traditional healer's place ○ Other.....

8.In order to help, we need to understand how and why the baby died. So please tell me the story of the pregnancy, delivery and baby.

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9. After how many months of pregnancy was the baby born ? ☐☐ months

10. Was the baby born at the expected time ? ○ Early ○ On time ○ Late

11. Was the baby twin ? ○ Yes ○ No *(if no to to 13)*

12. If yes, was the baby the first or second born twin ? ○ First ○ Second

13. Did the baby have any obvious deforminity ? ○ Yes ○ No

if yes, describe it.....
.....
.....
.....

14. If yes, did the baby have a very small head ? ○ Yes ○ No
(show photo of anencephaly)

15. If yes, did the baby have a mass or defect on the back of the head or spine ?
(show photo of meningomyelocele) ○ Yes ○ No

16. If yes, did the baby have a cleft lip or palate ? ○ Yes ○ No
(show photo ofcleft lip and palate)

17. If yes, did the baqby have abnormal arms or legs ? ○ Yes ○ No

18. How big was the baby ? ○ Very small ○ Samaller than usual ○ Normal
○ Bigger than usual

19. Do we know the birth weight of the baby ? *(look at health records)* ☐☐☐ grams ○ No

20. Did the baby have bruises or signs of injury ? ○ Yes ○ No ○ Don't know

21. Was the baby born alive or dead ? ○ Alive ○ Dead *(if alive go to 31)*

22. Was the baby still moving when labour started ?
○ Yes ○ No ○ Don't know
(if alive go to 24)

23. If no, when did you last feel the baby moving ?
○ Hours before labour started ○ Days before labour started

24. If no, do you think that the baby had died before you went into labour ?
○ Yes ○ No *(if yes stop interview)*

25. Did the baby ever cry, even little ? ○ Yes ○ No *(if yes go to 31)*

26. Did the baby ever move, even little ? ○ Yes ○ No *(if yes go to 31)*

27. Did the baby ever breathe, even little ? ○ Yes ○ No *(if yes go to 31)*

28. Did the baby look like a normal baby, or had the skin and body changed and become pulpy/puffy/ mushy/swollen ?
○ Yes ○ No ○ Don't know

29. Was anything done to try to help the baby to breathe at birth ?
○ Yes ○ No ○ Don't know

30. If yes, what was tried among these ?
○ Stimulation ○ Mouth to mouth ○ Mouth to tube and mask
○ Bag and mask

Stillbirths Stop Here

31. Did the baby cry at birth ? ○ Yes ○ No *(if yes go to 33)*

32. If no, how long after birth did the baby first cry ?
○ Within 5 min ○ Within 5-30 min ○ More than 30 min
○ Never

33. Was anything done to try to help the baby to breathe at birth ?
○ Yes ○ No *(if yes go to 35)*

34. If yes, what was tried among these ?
O Stimulation O Mouth to mouth O Mouth to tube and mask
O Bag and mask

35. Was the baby sleepy and floppy at the time of birth? O Yes O No

36. Did the baby ever have difficulty breathing ? O Yes O No *(if no go to 45)*

37. If yes, what was the difficulty ? O Intermittent breathing O Fast breathing

38. If yes, when did the difficulty start ?
O Immediately at birth O Not immediately but within 6 hours
O More than 6 hours after birth

39. If yes, how long did the difficulty continue ? ☐☐ days

40. If yes, did the difficulty continue until the baby died ? O Yes O No

41. If yes, was there chest indrawing ? O Yes O No

42. If yes, was there grunting (demonstrate) ? O Yes O No

43. If yes, was there nostril flaring (demonstrate) ? O Yes O No

44. If yes, did the baby have pneumonia ? O Yes O No

45. Did the baby always suckle normally ? O Yes O No *(if yes go to 52)*

46. If no, when did the problem start ?
O On the first day O After the first day but in the first 3 days
O After the first 3 days

47. If no, how long did the problem continue ? ☐☐ days

48. If no, did the feeding problem continue until the baby died ? O Yes O No

49. If no, could the baby open his/her mouth ? O Yes O No

50. If no, did the baby arch her back and have spasms ? *(Show photo)* O Yes O No

51. If no, did the baby have tetanus ? O Yes O No

52. Did the baby have more frequent liquid stools than usual ? O Yes O No

53. Did the baby have diarrhoea ? O Yes O No *(if no go to 56)*

54. If yes, was there mucus or blood in the stool ? O Yes O No

55. If yes, how long did the diarrhoea continue ? ☐☐ days

56. Did the baby vomit everything ? O Yes O No *(if no go to 60)*

57. Did the baby have a fever ? O Yes O No

58. If yes, when did the fever start ? ☐☐ days

59. If yes, how long did the fever continue ? ☐☐ days

60. Were the baby's skin and eyes very yellow ? O Yes O No

61. Did the baby have any fits/convulsions/seizures ? O Yes O No *(if no go to 63)*

62. If yes, on which day of life ? O First day O After first day

63. Did the baby feel cold ? O Yes O No *(if no go to 66)*

64. If yes, when did the baby start feeling cold ? ☐☐ days

65. If yes, how long did the baby feel cold ? ☐☐☐ hours ☐☐ days

66. Did the baby have pustules on the skin ? O Yes O No

67. Did the baby have ear discharge ? O Yes O No

67. Did the baby have red eyes with pus in them ? O Yes O No 4

67. Did the baby have a bright red ring on the skin around the umbilical cord stump ? O Yes O No

68. Did the baby bleed ? O Yes O No *(if no go to 70)*

69. if yes, from where ?.....
.....

70. what did the baby's fontanelle look like ? O Sunken down O Normal O Bulging up

71. Did the baby have become drowsy and unconsious when she/he had been normal before ? O Yes O No

72. How long was the baby ill before she/he died ? ☐☐ days

73. Did the baby die suddenly without any sign of illness ? O Yes O No

74. Did the baby have some other problem that we haven't discussed ? O Yes O No *(if no go to 76)*

75. if yes, what problem ?.....
.....
.....
.....

Newborn Care

76. Where was the baby born ?

O At home O Hetauda Hospital O Other Hospital O P H C O H P
O S H P O Private clinic O Medical Shop O Area around home O Field / Jungle
O Shed O Others..... *(for hospital and phc delivery go to question no. 87)*

77. Was there a fire, stove or other form of heating in the delivery room ?

O Before baby was born O After baby was born O Before and after baby was born
O No O Don't know

78. Who helped with the delivery ?

☐ Doctor ☐ Nurse ☐ ANM ☐ HA / AHW / CMA
☐ tTBA / UntTBA ☐ MCHW ☐ VHW ☐ FCHV
☐ Mother in law ☐ Family Member ☐ Neighbours / Friends ☐ None (Alone)
☐ Others.....

79. Did the person who helped, have washed his/her hands ?

O Yes O No O Don't know

80. Do you know what is this ? *(Show delivery kit)* O Yes O No *(if no go to question no.83)*

81. Did you use this ? O Yes O No *(if no go to question no.83)*

82. If yes, which one did you use ? O MCH Product O Mother's Group Product

83. What was the cord cut with ?

O Boild Blade O Unboiled Blade O knife / scissors O Sickle / woodknife O Bamboo
O Don't know O Others.....

84. What was put on the cord stump after it was cut ?

O Oil O Turmeric O Unwashed cloth / cotton O Washed cloth / cotton O Medicin /dettole
O Powder O Mud O Nothing O Don't know O Other.....

85. How long after birth was the baby wrapped up ?

☐☐ After minutes or ☐☐ After hour/s

86. How long after birth was the baby bathed ?

☐☐ After minutes or ☐☐ After hour/s or ☐☐ After day/s

87. What was the first food given to the baby ?

O Mother's milk O Other mother's milk O Cow /buffalo milk O Furmola/ Lactozine
O Milk food O Ghee/Sugar/ Honey O Oil O Don't know
O Others.....

88. Has your baby had the BCG immunization ? O Yes O No O Don't know

Breastfeeding

89. Have you breastfeed your baby ? O yes O No *(If no go to question no. 92)*

90. How long after the birth did you first feed the baby ?

☐☐ After minutes or ☐☐ After hour/s or ☐☐ After day/s

91. Did you throw first milk before you feed the baby first ? O Yes O No

92. Are you feeding the baby only mother's milk or are you giving some other things like : water, lactogen, cow's/buffalo milk as well ?

O Mother's milk O Other things too

Treatment of the baby

(if baby had fever, diarrhoea, jaundice, cord infection and caughing ask the following questions)

93. Did you seek treatment when the baby was sick ?

O Yes O No *(if yes go to question no. 95)*

94. if not,why did not you go ?

.....
.....
.....

95. Who did you consult with at first ? *(stop interview)*

O Doctor O Staff Nurse O HA O ANM O AHW
O Medical shopkeeper O MCHW O FCHV O TBA O Dhami
O Others

96. How did you get there ?

☐ Walked ☐ Carried ☐ Ambulence ☐ Car / Tempo / Bus / Rickshaw
☐ Stretcher (MIRA) ☐ Stretcher (Other) ☐ Doko

97. Did they treat the baby ? O Yes O No *(if no go to question no. 100)*

98. What did they do ?

.....
.....
.....

99. How long was it from the start of the baby's illness to receive treatment ?

☐☐ After hours or ☐☐ After day or ☐☐ After week

100. Did you then consult anyone else ? O Yes O No *(If No go to 105)*

101. How did you get there ? 6

☐ Walked ☐ Carried ☐ Ambulence ☐ Car / Tempo / Bus / Rickshaw
☐ Stretcher (MIRA) ☐ Stretcher (Other) ☐ Doko

102. Were you reffered or did you just decide to go ? ○ Reffered ○ Just decided to go

103. Did they treat the baby ? ○ Yes ○ No *(if no, go to 104)*

104. What did they do ?

.....

.....

.....

104. How long was it from the start of the baby's illness to receive treatment ?

☐☐ After hours or ☐☐ After day or ☐☐ After week

105.Did you or your family member give a treatment without consulting anyone else ?

○ Yes ○ No

107. How much did you paid in total for transportation and treatment ? Rs.....

108. How did you get money ?

☐ Wages Rs.....

☐ Saving Rs.....

☐ Sale of Land Rs.....

☐ Sale of Livestock Rs.....

☐ Borrowed money from relatives Rs.....

☐ Borrowed money from Lender Rs.....

☐ Borrowed money from MIRA MCH Fund Rs.....

☐ Borrowed money from Other Fund Rs.....

APPENDIX D: MIRA DHANUSHA SURVEILLANCE QUESTIONNAIRES

मिरा, धनुषा	Q no	MIRA, DHANUSHA
गरिमा प्रश्नावली प्रयोग गर्ने बिधीहरु		**GARIMA QUESTIONNAIRE INSTRUCTIONS**
		The complete questionnaire comprises 6 modules: which can be used altogether in situations where both mother and baby are alive at 28 days after a birth.
		Separate modules may be applied with verbal autopsy forms, for monitoring women's group participants and in other situations that may arise in the course of the trial. See the top of each module for guidelines of when to apply it. If the modules are used separately, fill in the database and respondent information at the start of every module and check if the form has been answered before using the box to the right of the instructions of where to apply each module.
		In the case that all 6 modules are being asked together:
मिराको कर्मचारीले तपाईलाई यस्तो गरिमा प्रश्नावली यो भन्दा अगाडी भरेको थियो ? ○ थियो ○ थिएन		Has a MIRA employee filled in a GARIMA questionnaire with you before? ○ Yes ○ No
यदि थियो भने कहां ? गा.वि.स. नं .... वडा नं. ..... टोल		If yes where? VDC No ___ ___ Ward no ___ Tole _____
यदि थियो भने कहिले ? साल .... महिना		If yes when? Year ____ ____ Month ____ ____
		• Fill in the database information boxes, consent, information about who answered the questions and who was present at the interview on the first module.
		• Skip these boxes on subsequent modules during the interview *unless the*

		respondent changes from one module to another.
		• If the respondent changes or the people present at the interview change between modules or if modules are completed at different times fill in the boxes at the beginning of the module where the change took place.
		• At the end of the interview or when checking the form before submitting it, fill in the database information boxes up to the MW name at the beginning of every module so that there is no chance of modules getting mixed up between respondents.
		If the respondent replies that GARIMA has been filled in before, it is important to check when and where. If GARIMA has been filled-in completely for the birth being covered on this visit (e.g. while the women was in another study VDC), then there will be no need to fill in the modules again. However, if the modules were filled in for an earlier birth (a different baby) or about another woman and her baby from the same household then the modules must be filled in.

मिरा, धनुषा		MIRA DHANUSHA
GARIMA गरिमा प्रश्नावली : बिबहीत महिलाको बासस्थान मोड्युल		**GARIMA questionnaire: LOCATION OF MARRIED WOMAN MODULE**
तलका अवस्थामा यो मोड्युल प्रयोग गर्नहोला - आमा र बच्चा २८ दिन सम्म जिवीतै भएमा - बच्चाको मृत्यु २८ दिन सम्म भएको र आमा जिउदै भएको - आमाको मृत्यु २८ दिन सम्म भएको र बच्चा जिउदै भएको - आमा र बच्चा दुबैको मृत्यु २८ दिन सम्म भएको - २८ दिन पछी आमाको मृत्यु भएको (यदि गरिमा प्रश्नावली मृत्यु भन्दा अगाडी भरेको थिएन)		Use this module in the following situations: - Both mother and baby alive at 28 days - Mother alive but baby dead at 28 days - Baby alive but mother dead at 28 days - Both mother and baby dead at 28 days - Mother dead after 28 days (if GARIMA not filled before the death)
मिराको कर्मचारीले तपाईलाई यो भन्दा अगाडी महिलाको बासस्थानको बरेमा सोध्नु भएको थियो ? ○ थियो ○ थिएन		Has a MIRA employee asked you about the location of the married woman before? ○ Yes ○ No
यदि थियो भने कहां ? गा.वि.स. नं .... वडा नं. ..... टोल		If yes where? VDC No ____ ____ Ward no ___ Tole _____
यदि थियो भने कहिले ? साल .... महिना		If yes when? Year ____ ____ Month ____ ____
DATABASE IDENTIFICATION INFORMATION		**DATABASE IDENTIFICATION INFORMATION**
अन्तरवार्ता लिने व्यक्तिको आई डी नं.		INTERVIEWER ID. ____ ____
अन्तरवार्ता लिईएको मिति : .... गते .... महिना ..... साल		DATE OF INTERVIEW ____ ____ / ____ ____ / ____ ____ ____ ____
अवलोकन गरेको ☐		INTERVIEW OBSERVED ☐
युनीट अफीसमा चेक भएको ☐		CHECKED IN UNIT OFFICE ☐
अन्तरवार्ता भईसकेको धरमा गाएर चेक भएको ☐		CHECKED BY RE-VISITING HOUSE WHERE INTERVIEW TOOK

		PLACE ⌟
घरमुलीको नाम		Name of household head _____
गा.वि.स. नं .... वडा नं. ..... टोल		VDC no _____ _____ Ward no _____ Tole _____
घरधुरी. नं		Household number ___ ___ ___ ___
MW को परिचय नं :		MW (married woman's) ID number ___ ___ ___ ___ ___ ___ ___
MW को नाम.....		MW (married woman's) name _____
MW को जन्म मिति : .... गते .... महिना ..... साल ***(यदि जन्म मिति थाहा छैन भने उमेर वर्षमा लेख्नुहोस्)*** MW को उमेर .... वर्ष		Date of birth of MW ___ ___ / ___ ___ / ___ ___ ___ ___ If you do not know the exact date of birth please give the Age of the MW ___ ___ years
BABY ID बच्चाको परिचय नं :		BABY ID number _____ ___ ___

अर्न्तवार्ताको लागी अनुमती लिएको ⌴		PERMISSION GRANTED FOR THE INTERVIEW ⌟
अर्न्तवार्ताको लागी अनुमती दिनेको सही अथवा औठाको छाप (त्याप्चे):		Signature or thumbprint of person granting permission _____
क. मुख्य उत्तरदाताको नाम :.....	a.	Name of main interviewee _____
ख. मुख्य उत्तरदाता संग MW को नाता	b.	Relationship to the married woman _____
ग. अन्य उत्तरदाताको नाम :	c.	Name of other interviewee _____
घ. अन्य उत्तरदाता संग MW को नाता	d.	Relationship of other interviewee to the married woman _____
ङ. अन्तर्वार्ताको समयमा को-को उपस्थित हुनुहुन्थ्यो ? ⌴ MW ⌴ सासु ⌴ ससुरा ⌴ श्रीमान् ⌴ ससुराली घरको अन्य महिला ⌴ आमा ⌴ बुवा ⌴ माइतीका अन्य महिला ⌴ महिला छिमेकी ⌴ महिला साथी ⌴ पुरुष छिमेकी ⌴ अन्य ।	e.	Who was present at the interview? ⌟ MW married woman herself (to whom the interview refers) ⌟ Mother-in-law ⌟ Father-in-law ⌟ Husband ⌟ Other women from husband's household ⌟ Mother ⌟ Father ⌟ Other women from the parental household ⌟ Female neighbour ⌟ Female Friend

		⌟ Male neighbour ⌟ Other
बासस्थान		**LOCATION OF MW DURING PREGNANCY & POSTPARTUM**
L १. तपाई अहिले कहाँ र कस्को घरमा हुनुहुन्छ ? ○ आफ्नो घर (ससुराल) ○ माइती ○ भाडा ○ नातेदार ○ अन्य	L1.	Whose house are you staying in at the moment? ○ Own / Husband's home (sasurali) ○ Parental home (maiti) ○ Rented accommodation ○ Relative's home ○ Other
(सबै MW को आफ्नो वा ससुराली घर र माईतीघरको प्रश्न नं L२ र L३ मा ठेगना उल्लेख गर्नुहोस र यदि MW भाडाको घर वा नातेदार को घर वा अन्य ठाउंमा बसिरहेको भए प्रश्न नं L४, L५ वा L६ मा उल्लेख गर्नुहोस् ।)		***Please write in questions L2 and L3 the own (sasurali) and parental (maiti) addresses for ALL MW. If the MW is living in rented accommodation, a relative's home or elsewhere please write the addresses in questions L 4, L5 and L6.***
L २. यदि MW को आफ्नो (ससुराल) घर नेपाल भन्द बहिर छ भने देश लेख्नुहोस ***(यदि नेपालमा छ भने L २.१ मा जानुहोस्)*** ⌴ भारत ⌴ अन्य देश भएमा खुलाउनुहोस ..... यदि भारत भएमा भारतको ठाउं लेख्नुहोस : पंचायत ..... जिल्ला ..... राज्य.....	L2.	If the Married Woman's own (husband's) home is outside Nepal write the country. ***(If in Nepal go to 2.1)*** ⌟ India ⌟ Other (specify) _____ If in India please write the place: Panchayat _____ District _____ State _____
L २.१ यदि MW को आफ्नो (ससुराल) घर धनुषा भन्दा बहिर छ भने जिल्ला लेख्नुहोस	L2.1	If the married woman's own (husband's) home is outside Dhanusha district, please write the district _____
L २.२ MW को आफ्नो (ससुराल) घरको गा.वि.स. नं.: .... वा नाम ..... वडा नं. .... टोल	L2.2	Married woman's own (husband's) home VDC No. ____ ____ or name _____ ward no. ____ ____ Tole _____
L २.३ ससुरालको घरधुरी संख्या : .... *(घरधुरी भन्नाले एउटै चुल्हो प्रयोग गरी खाने परिवारलाई सम्झनुपर्दछ)*	L2.3	Married woman's own (husband's) home household size (no. of people eating from the same fireplace / stove) _____
L ३. यदि MW को माईती घर नेपाल भन्द बहिर छ भने देश लेख्नुहास ***(यदि नेपालमा छ भने ३.१ मा जानुहोस्)*** ⌴ भारत ⌴ अन्य देश भएमा खुलाउनुहोस	L3.	If the Married Woman's parental (maiti) home is outside Nepal write the country. ***(If in Nepal go to 3.1)*** ⌟ India ⌟ Other (specify) _____

यदि भारत भएमा भारतको ठाउं लेख्नुहोस : पंचायत ..... जिल्ला ..... राज्य.....		If in India please write the place: Panchayat _____ District _____ State _____
L ३.१ यदि MW को माईती घर धनुषा भन्दा बहिर छ भने जिल्ला लेख्नुहोस	L3.1	If the married woman's parental (maiti) home is outside Dhanusha district, please write the district _____
L ३.२ MW को माईती घरको गा.वि.स. नं : .... वा नाम ..... वडा नं. .... टोल	L3.2	Married woman's parental (maiti) home VDC No. ____ ____ or name _____ ward no. ___ ___ Tole _____
L ३.३ माइतीको घरधुरी संख्या : *(घरधुरी भन्नाले एउटै चुल्हो प्रयोग गरी खाने परिवारलाई सम्झनुपर्दछ)*	L3.3	Married woman's parental (maiti) home household size (no. of people eating from the same fireplace / stove) ___ ___
L ४. MW को भाडा घरको गा.वि.स. नं. : .... वा नाम ..... वडा नं. .... टोल	L4	Married woman's rented home VDC No. ____ ____ or name _____ ward no. ___ ___ Tole _____
L ४.१ भाडा घरको घरधुरी संख्या : .... *(घरधुरी भन्नाले एउटै चुल्हो प्रयोग गरी खाने परिवारलाई सम्झनुपर्दछ)*	L4.1	Married woman's rented home household size (no. of people eating from the same fireplace / stove) _____ _____
L ५. MW को नातेदारको गा.वि.स. नं : .... वा नाम ..... वडा नं. .... टोल	L5	Married woman's relative's home VDC No. ____ ____ or name _____ ward no. ___ ___ Tole _____
L ५.१ नातेदारको घरको घरधुरी संख्या : .... *(घरधुरी भन्नाले एउटै चुल्हो प्रयोग गरी खाने परिवारलाई सम्झनुपर्दछ)*	L5.1	Married woman's relative's home household size (no. of people eating from the same fireplace / stove) _____ _____ ____
L ६. MW को अन्य ठाउंको गा.वि.स. नं : .... वा नाम ..... वडा नं. .... टोल	L6	Married woman's other home / place VDC No. ____ ____ or name _____ ward no. ___ ___ Tole _____
L ६.१ अन्य ठाउंका घरधुरी संख्या : .... *(घरधुरी भन्नाले एउटै चुल्हो प्रयोग गरी खाने परिवारलाई सम्झनुपर्दछ)*	L6.1	Married woman's other home / place household size (no. of people eating from the same fireplace / stove) ___ ____
L ७. यदि भाडामा बस्नु भएको हो भने कति समयदेखि बस्दै आइरहनु भएको छ ? .... दिन .... महिना .... वर्ष	L7	If you are staying in rented accommodation, how long have you been staying there? ___ ___ Days ___ months ___ years
L ८. ***गर्भावस्थाको समयमा जुन घरमा धेरै समय बसेको हो उही घरमा चिन्ह लगाउनुहोस् र उही घरको बारेमा छलफल गर्नुहोस्***	L8	Please mark which home you stayed in most during your pregnancy and we will be discussing about this home

○ आफ्नो/श्रीमान्को घर (ससुराल) ○ बुबाको घर (माइती) ○ भाडाको घर ○ नातेदारको घर ○ अन्य		○ Own / Husband's home (sasurali) ○ Parental home (maiti) ○ Rented accommodation ○ Other Relative's home ○ Other
L ८.१ यो बच्चा गर्भमा रहँदा कति समयसम्म आफ्नो घर (ससुराल) मा बस्नु भयो ? सम्झेको समय लेख्नुहोस : .... दिन वा .... हप्ता वा .... महिना	L8.1	During this (recent) pregnancy how much time did you spend in husband's (sasurali) home? ___ ___ Days or ___ ___ weeks or ___ ___ months
L ८.२ यो बच्चा गर्भमा रहँदा कति समयसम्म माईतीमा बस्नु भयो ? सम्झेको समय लेख्नुहोस : .... दिन वा .... हप्ता वा .... महिना	L8.2	During this (recent) pregnancy how much time did you spend in at your parental (maiti) home? ___ ___ Days or ___ ___ weeks or ___ ___ months
L ८.३ यो बच्चा गर्भमा रहँदा कति समयसम्म भाडाको घरमा बस्नु भयो ? सम्झेको समय लेख्नुहोस : .... दिन वा .... हप्ता वा .... महिना	L8.3	During this (recent) pregnancy how much time did you spend in rented accommodation? ___ ___ days or ___ ___ weeks or ___ ___ months
L ८.४ यो बच्चा गर्भमा रहँदा कति समयसम्म नातेदारको घरमा बस्नु भयो ? सम्झेको समय लेख्नुहोस : .... दिन वा .... हप्ता वा .... महिना	L8.4	During this (recent) pregnancy how much time did you spend in another relative's home? ___ ___ days or ___ ___ weeks or ___ ___ months
L ८.५ यो बच्चा गर्भमा रहँदा कति समयसम्म अन्य ठाउमा बस्नु भयो ? सम्झेको समय लेख्नुहोस : .... दिन वा .... हप्ता वा .... महिना	L8.5	During this (recent) pregnancy how much time did you spend elsewhere? ___ ___ days or ___ ___ weeks or ___ ___ months
(माथिको जवाफको आधारमा गर्भावस्थाको समयमा जुन घरमा धेरै समय बसेको हो त्यसैको बारेमा उत्तरदातासँग छलफल गर्नुहोस् ।)		*According to the answers above, whichever home you spent the most time in during your pregnancy is the home that we will be asking you about.*
L ९. हालको बच्चालाई कहाँ जन्म दिनुभयो ? ○ धनुषा जिल्ला भित्र ○ धनुषा जिल्ला भन्दा बहिर : जिल्ला लेख्नुहोस ..... ○ भारत : भारतको ठाउं लेख्नुहोस : पंचायत ..... जिल्ला ..... राज्य..... ○ अन्य देश	L9	Where did you give birth to this baby? ○ In Dhanuha district ○ Outside Dhanusha district : write the district _____ ○ India : write place in India: Panchayat _____ District _____ State _____ ○ Other country _____
L ९.१ हालको बच्चालाई कुन ठाउंमा जन्म दिनुभयो ?	L9.1	In which place did the birth occur?
○ घरमा	**○स्वास्थ्य संस्था** (तल ठाउं उल्लेख गर्नुहोस)	**○ At home**	**○ Health facility** (write the place below)
○ आफ्नो/श्रीमान्को घर (ससुराल)	○ जनकपुर अचल अस्पताल	○ Own / husband's home	○ Janakpur zonal hospital
○ बुबाको घर (माइती)	○ अन्य अस्पताल	○ Parental home (maiti)_	○ Other hospital _____

○ भाडाको घर	○ मेडिकल कलेज		○ Rented accommodation	○ Medical college _____
○ नातेदारको घर	○ प्रा.स्वा केन्द्र		○ Other relative's home	○ Primary Health Care Centre _____
○ अन्य घर	○ निजी क्लिनिक/नर्सिङ्ग होम		○ Other home	○ Private clinic or nursing home ____
(***प्रश्न नं L ९.२ मा जानुहोस्***)	○ स्वास्थ्य चौकी			○ Health Post _____
	○ उप स्वास्थ्य चौकी		***Go to question L 9.2***	○ Sub Health post _____
	○ परिवार नियोजन संघ			○ Family planning _____
	○ शिविर			○ Health camp _____
	○ आर्युवेदीक अस्पताल			○ Ayurvedic hospital _____
	○ औषधी पसल			○ Medicine shop _____
	○ अस्पताल लादां लादै बाटोमा			○ On the way to the hospital ___
	○ अन्य (उल्लेख गर्नुहोस)			○ Other place
	(***प्रश्न नं L १०.१ मा जानुहोस्***)			_____***Go to question no L 10.1***

L ९.२ यदि तपाईले घरमा बच्चालाई जन्म दिनुभयो भने घरको कुन ठाउंमा भयो ? ○ बिषेश तयरी भएको कोठा ○ सामान्य सुत्ने कोठा ○ आँगन/पिढी/छत ○ खेत/वारी/जंगल ○ गोठ	L9.2	If you gave birth at home, in which part of the home did the birth occur? ○ Specially prepared room ○ Ordinary sleeping room ○ Outside in courtyard / on roof ○ In fields or forest ○ Cowshed
L १० बच्चा जन्मिसकेपछि अहिले सम्म जुन घरमा धेरै समय बसेको हो उही घरमा चिन्ह लगाउनुहोस् ○ आफ्नो/श्रीमान्को घर (ससुराल) ○ बुबाको घर (माइती) ○ भाडाको घर ○ नातेदारको घर ○ अन्य	L10	Since giving birth until now which place have you stayed most? ○ Own / Husband's home (sasurali) ○ Parental home (maiti) ○ Rented accommodation ○ Relative's home ○ Other
L १०.१ बच्चा जन्मिसकेपछि कति समयसम्म आफ्नो घर (ससुराली) मा बस्नुभयो ? सम्झेको समय लेख्नुहोस .... दिन साल .... महिना..... ..... गते .... देखी साल..... ..... महिना .... गते .... सम्मा	L10.1	Since the baby was born how much time have you spent at your own/ husband's (sasurali) home? __ __ Days From year ___ ___ month ___ ___ day ___ ___ to year ___ ___ month ___ ___ day ___ ___
L १०.२ बच्चा जन्मिसकेपछि कति समयसम्म माइतीमा बस्नुभयो ? सम्झेको समय लेख्नुहोस : .... दिन	L10.2	Since the baby was born how much time have you spent at your parental (maiti) home? ___ __ Days

साल .... महिना..... ..... गते .... देखी साल..... ..... महिना .... गते .... सम्मा		From year ___ ___ month ___ ___ day ___ ___ to year ___ ___ month ___ ___ day ___ ___
L१०.३ बच्चा जन्मिसकेपछि कति समयसम्म भाडाको घरमा बस्नुभयो ? सम्झेको समय लेख्नुहोस : .... दिन साल .... महिना..... ..... गते .... देखी साल..... ..... महिना .... गते .... सम्मा	L10.3	Since the baby was born how much time have you spent in rented accommodation? __ __ Days From year ___ ___ month ___ ___ day ___ ___ to year ___ ___ month ___ ___ day ___ ___
L१०.४ बच्चा जन्मिसकेपछि कति समयसम्म नातेदारको घरमा बस्नु भयो ? सम्झेको समय लेख्नुहोस : .... दिन साल .... महिना..... ..... गते .... देखी साल..... ..... महिना .... गते .... सम्मा	L10.4	Since the baby was born how much time have you spent at your other relatives' homes? __ __ Days From year ___ ___ month ___ ___ day ___ ___ to year ___ ___ month ___ ___ day ___ ___
L१०.५ बच्चा जन्मिसकेपछि कति समयसम्म अन्य ठाउँमा बस्नु भयो ? सम्झेको समय लेख्नुहोस : .... दिन साल .... महिना..... ..... गते .... देखी साल..... ..... महिना .... गते .... सम्मा	L10.5	Since the baby was born how much time have you spent elsewhere ? __ __ Days From year ___ ___ month ___ ___ day ___ ___ to year ___ ___ month ___ ___ day ___ ___

मिरा, धनुषा		MIRA DHANUSHA
GARIMA गरिमा प्रश्नावली: सामजिक तथा आर्थिक मोड्युल		**GARIMA questionnaire: SOCIOECONOMIC MODULE**
तलका अवस्थामा यो मोड्युल प्रयोग गर्नहोला - आमा र बच्चा २८ दिन सम्म जिवीतै भएमा - बच्चाको मृत्यु २८ दिन सम्म भएको र आमा जिउदै भएको - आमाको मृत्यु २८ दिन सम्म भएको र बच्चा जिउदै भएको - आमा र बच्चा दुबैको मृत्यु २८ दिन सम्म भएको - २८ दिन पछी आमाको मृत्यु भएको (यदि गरिमा प्रश्नावली मृत्यु भन्दा अगाडी भरेको थिएन) - ५ बर्ष भन्दा मुनीको बच्चाको मृत्यु - महीलाको मृत्यु भएको		*Use this module in the following situations:* - *Mother and baby alive at 28 days* - *Mother Alive but baby dead at 28 days* - *Baby alive but mother dead at 28 days* - *Both baby and mother dead at 28 days* - Mother dead after 28 days (if GARIMA not filled before the death) - *Child death* - *Female death*
मिराको कर्मचारीले तपाईलाई यो भन्दा अगाडी सामजिक तथा आर्थिकको बरेमा सोध्नु भएको थियो ? ○ थियो ○ थिएन		Has a MIRA employee asked you socio-economic questions before? ○ Yes ○ No
यदि थियो भने कहा ? गा.वि.स. नं .... वडा नं. ..... टोल		If yes where? VDC No ___ ___ Ward no ___ Tole _____
यदि थियो भने कहिले ? साल .... महिना		If yes when? Year ____ ____ Month ____ ____
DATABASE IDENTIFICATION INFORMATION		**DATABASE IDENTIFICATION INFORMATION**
अन्तरवार्ता लिने व्यक्तिको आई डी नं.		INTERVIEWER ID. ___ ___
अन्तरवार्ता लिईएको मिति : .... गते .... महिना ..... साल		DATE OF INTERVIEW ____ / ____ / ____ ____ ____
अवलोकन गरेको ☐		INTERVIEW OBSERVED ☐

युनीट अफीसमा चेक भएको ☐		CHECKED IN UNIT OFFICE ☐
अन्तरवार्ता भईसकेको धरमा गाएर चेक भएको ☐		CHECKED BY RE-VISITING HOUSE WHERE INTERVIEW TOOK PLACE ☐
घरमुलीको नाम		Name of household head _____
गा.वि.स. नं .... वडा नं. ..... टोल		VDC no _____ Ward no ____ Tole _____
घरधुरी. नं		Household number ___ ___ ___ ___
MW को परिचय नं :		MW (married woman's) ID number ___ ___ ___ ___ ___ ___ ___ ___
MW को नाम.....		MW (married woman's) name _____
MW को जन्म मिति : .... गते .... महिना ..... साल *(यदि जन्म मिति थाहा छैन भने उमेर वर्षमा लेख्नुहोस्)* MW को उमेर .... वर्ष		Date of birth of MW ___ ___ / ___ ___ / ___ ___ ___ ___ If you do not know the exact date of birth please give the Age of the MW ___ ___ years
BABY ID बच्चाको परिचय नं :		BABY ID number _____ ___ ___

अर्न्तवार्ताको लागी अनुमती लिएको ☐		PERMISSION GRANTED FOR THE INTERVIEW ☐
अर्न्तवार्ताको लागी अनुमती दिनेको सही अथवा औठाको छाप (त्याप्चे):		Signature or thumbprint of person granting permission _____
क. मुख्य उत्तरदाताको नाम :.....	a.	Name of main interviewee _____
ख. मुख्य उत्तरदाता संग MW को नाता	b.	Relationship to the married woman _____
ग. अन्य उत्तरदाताको नाम :	c.	Name of other interviewee _____
घ. अन्य उत्तरदाता संग MW को नाता	d.	Relationship of other interviewee to the married woman _____
ङ. अन्तर्वार्ताको समयमा को-को उपस्थित हुनुहुन्थ्यो ? ☐ MW ☐ सासु ☐ ससुरा ☐ श्रीमान् ☐ ससुराली घरको अन्य महिला ☐ आमा ☐ बुवा ☐ माइतीका अन्य महिला ☐ महिला छिमेकी ☐ महिला साथी ☐ पुरुष छिमेकी ☐ अन्य ।	e.	Who was present at the interview? ☐ MW married woman herself (to whom the interview refers) ☐ Mother-in-law ☐ Father-in-law ☐ Husband ☐ Other women from

		husband's household ⌟ Mother ⌟ Father ⌟ Other women from the parental household ⌟ Female neighbour ⌟ Female Friend ⌟ Male neighbour ⌟ Other
धर्म तथा समुदाय		ETHNICITY AND RELIGION
SE १. तपाई कुन जात/ समुदायको हो ? (*खाली ठाउमा समन्धीत समुहको थर, जात वा उपजात उल्लेख् गर्नुहास)* ○ ब्रहमाण ..... ○ भुमिहार ..... ○ कायस्थ ..... ○ क्षेत्री ..... ○ यादव ..... ○ कोइरी ..... ○ **सुडी/तेली** ..... ○ **मण्डल:** ○ धानुक ○ खत्वे ○ अन्य ..... ○ **जनजाति:** ○ मगर ○ तामाङ्ग ○ नेवार ○ माझी ○ दनुवार ○ अन्य ..... ○ **मुस्लिम:** ○ नट ○ धोवी ○ राइन ○ शाह ○ शेख ○ अन्सारी ○ रेजा ○ कवारी ○ खातुन ○ दाउत ○ चौधरी ○ अन्य ..... ○ **दलित:** ○ पासवान ○ मुसहर ○ डुम ○ कापर ○ तत्मा (दास) ○ चमार ○ परियार(दमाई) ○ सार्की ○ विश्वकर्मा (बि.क.) ○ ढाँगर ○ बिन (मलाहा) ○ धोवी ○ नट ○ सेन्चुरी ○ राम ○ मल्लिक ○ अन्य ..... ○ **अन्य:**	SE1.	What is your caste / ethnic group? (please write main surname / caste group or sub-group in the blank space) ○ **Brahmin** _____ ○ **Bhumihaar** _____ ○ **Kayast** _____ ○ **Chettri** _____ ○ **Yadav** _____ ○ **Koiri** _____ ○ **Sudi / Teli** _____ ○ **Mandal** ○ Dhanuk ○ Khatbe ○ Other _____ ○ **Janjati** ○ Magar ○ Tamang ○ Newar ○ Majhi ○ Danuwar ○ Other _____ ○ **Muslim** ○ Nat ○ Dhobi ○ Rain ○ Shaha ○ Shekh ○ Ansaari ○ Reja ○ Kabaari ○ Khatun ○ Daut ○ Chowdhury ○ Other _____ ○ **Dalit** ○ Paswan ○ Musahar ○ Dum ○ Kaapar ○ Tatma (Das) ○ Chamaar ○ Pariyar (Damai) ○ Sarki ○ Biswa Karma (BK) ○ Dhangar ○ Bin (Malaha) ○ Dhobi ○ Nat ○ Senchuri ○ Ram ○ Mallik ○ Other _____ ○ **Other caste** _____
SE २. तपाई कुन धर्म मान्नु हुन्छ ? ○ हिन्दु ○ मुस्लिम ○ बौद्ध	SE2	What is your religion?

○ क्रिश्चियन ○ अन्य		○ Hindu ○ Muslim ○ Buddhist ○ Christian ○ Other
घर सम्पत्ती तथा जीवन शैली		**ASSETS AND LIVING STYLE**
नोट : कृपया तपाईको गर्भावस्थाको समयमा सबैभन्दा धेरै समय जुन घरमा बस्नुभएको हो, त्यही घरधुरीको विवरण दिनुहोस् (प्रश्न नं. ८ को जवाफ हेर्नु होला) । घरधुरी भन्नाले एउटै चुल्हो प्रयोग गरी खाने परिवारलाई सम्झनुपर्दछ ।		*NOTE: please answer all these questions in reference to the home where you spent MOST of the pregnancy (answer to q.8) By household we mean a family or group eating from the same cooking pot or fireplace.*
SE ३. घर के ले बनेको छ ? पर्खाल : ☐ सिमेन्ट र इँटा ☐ माटो र इँटा ☐ माटो र ढुङ्गा ☐ टाट ☐ कर्कट पाता ☐ खर/पराल ☐ काठको पटाहा ☐ अन्य छाना : ☐ सिमेन्ट ☐ खपडा ☐ टायल ☐ कर्कट पाता ☐ फुस / खर/ पराल ☐ अन्य	SE3.	What is the house made of? Walls: ☐ Cement and bricks ☐ Mud and bricks ☐ Mud and Stone ☐ Mud and woven stems or bamboo (tat) ☐ Metal sheets ☐ Grass / Straw Thatch ☐ Planks of wood ☐ Other Roof: ☐ Cement ☐ Traditional tiles (Khapadaa) ☐ Tiles ☐ Metal sheets ☐ Grass / straw thatch ☐ Other
SE ४. तपाई धेरैजसो बसेको घरमा जम्मा कति कोठा छन् ? .... वटा	SE4	How many rooms are there in total in your house? _____ _____
SE ५. तपाई बस्ने घरमा कुन कुन बस्तुहरु छन् ? ☐ बिजुली ☐ रेडियो ☐ सादा टेलिभिजन ☐ रङ्गिन टेलिभिजन ☐ साइकल ☐ बयल/टायर गाडा ☐ रिक्सा (आफ्नो) ☐ मोटरसाइकल ☐ ट्र्याक्टर ☐ बस/ट्रक/जीप/कार/टेम्पो ☐ थ्रेसर ☐ पम्पसेट ☐ टेलिफोन ☐ सिलाई मेसिन ☐ ब्याट्री सेट ☐ सोलर सेट ☐ मोबाइल ☐ क्यामरा ☐ अन्य	SE5	What things do you have in your house? ☐ Electricity ☐ Radio ☐ Black & white TV ☐ Colour TV ☐ Bicycle ☐ Ox cart ☐ Rickshaw (own) ☐ Motorcycle ☐ Tractor ☐ Bus / truck / jeep / car / tempo ☐ Thresher ☐ Pump set ☐ Telephone ☐ Sewing machine ☐ Battery set ☐ Solar set ☐ Mobile phone ☐ Camera ☐ Other _____
SE ६. तपाईको घरको लागि खानेपानीको मुख्य श्रोत के हो ? ☐ घरैमा ल्याइएको निजी धारा ☐ सार्वजनिक धारा ☐ निजी इनार ☐ सार्वजनिक इनार ☐ छिमेकीको इनार ☐ आफ्नो चापाकल ☐ छिमेकीको चापाकल ☐ सार्वजनिक चापाकल ☐ नदी/खोला/नहर/पोखरी ☐ डिप बोरीङ्ग ☐ परम्परागत सार्वजनिक कुवा	SE6	What is the main drinking water source for your household? ☐ Piped drinking water in your residence ☐ Public water tap ☐ Own (private) well ☐ Public well ☐ Neighbours well ☐ Own (private) handpump in courtyard ☐ Neighbours handpump ☐ Public handpump ☐ River / stream/ canal / pond ☐ Deep bore hole (requires no pumping) ☐ Traditional public well

SE ७. तपाईको परिवारका सदस्यले कस्तो प्रकारको शौचालयको प्रयोग गर्नु हुन्छ ? ❑ फ्लस ❑ प्यान ❑ झाडी/खोला/मैदान ❑ खाल्डे चर्पी ❑ अन्य चर्पी	SE7	What kind of toilet do your family members use? ❑ Flush toilet ❑ Pan toilet ❑ Bushes / stream / open areas ❑ Pit toilet ❑ Other toilet
जिविकोपार्जन		**LIVELIHOODS**
नोट : कृपया तपाईको गर्भावस्थाको समयमा सबैभन्दा धेरै समय जुन घरमा बस्नुभएको हो, त्यही घरको विवरण दिनुहोस् । (प्रश्न नं. L८ को जवाफ हेर्नु होला ।)		*NOTE: please answer all these questions in reference to the home where you spent MOST of the pregnancy (answer to question no 8.)*
SE ८. तपाईको गर्भावस्थाको समयमा सबैभन्दा धेरै समय जुन घरमा बस्नुभएको हो, त्यही घरको आफ्नो जग्गा जमिन छ ? ❑ आफ्नो छ ❑ बटैया छ ❑ छैन	SE8	Does the household where you stayed have is own land? ❑ Yes own ❑ Yes sharecropped land ❑ No
(यदि छैन भने प्रश्न नं. SE ११ मा जानुहोस्)		***If no please go to question SE11***
SE ९. यदि छ भने, कति आफ्नो जग्गा छ ? .... बिगाहा .... कट्ठा .... धुर वा .... रोपानी .... आना .... दाम	SE9	If yes, how much of your own land do you have in total? __ __ Bigha __ __ Katta __ __ Dhur or __ __ Ropani __ __ Anna __ __ Dam
SE १०. यदि छ भने, कति बटैया वा अँधीया जग्गा छ ? .... बिगाहा .... कट्ठा .... धुर वा .... रोपानी .... आना .... दाम	SE10	If yes, how much land do you have on loan for sharecropping in total? __ __ Bigha __ __ Katta __ __ Dhur or __ __ Ropani __ __ Anna __ __ Dam
SE ११. के तपाई बस्ने घरमा पशुपालन वा कुखुरापालन गरेको छ ? ○ छ ○ छैन	SE11	Does your household keep any livestock or poultry? ○Yes ○ No
SE १२. खानेकुराको लागि तपाईको परिवारको मुख्य श्रोत के हो ? ❑ आफ्नो उत्पादन ❑ बटैया गरेर ❑ सोध भर्ना वा बन्धकी ❑ बनि/बइनबाट ❑ किनेर ❑ माइती घरबाट	SE12	What is your family's main source of staple food? ❑ Own production ❑ Share-cropping (bataiya) ❑ Use of land in place of interest on loan (Sodh barna / bandaki) ❑ Labour exchange (bain / bunni) ❑ Purchase of food ❑ Gifts from daughter-in-law's home (maiti)
SE १३. तपाईको घर परिवार भित्रबाट कोही सदस्य वा जिल्ल भन्दा बहिरको रोजगारमा जानुभएको छ अथवा गैरहनु हुन्छ ? ○ छ ○ छैन	SE13	Has any member of your family (household) migrated overseas or outside the district for work? Or does anyone go regularly? ○ Yes ○ No
(यदि छैन भने प्रश्न नं. SE १४ मा जानुहोस्)		***If no go to question SE14***
SE १३.१ यदि छ भने कहाँ ?	SE13.	If yes where?

☐ दिल्ली/पञ्जाब (भारत) ☐ अरब मुलूकहरु ☐ मलेसिया ☐ अन्य देश (उल्लेख गर्नुहोस्) ..... ☐ काठमाडौं ☐ नेपालको अन्य ठाउँ भए (उल्लेख गर्नुहोस्)	1	⌟ Delhi / Punjab (India) ⌟ Arab countries ⌟ Malaysia ⌟ Other country specify_____ ⌟ Kathmandu ⌟ Elsewhere in Nepal specify _____
खाद्य सुरक्षा		**FOOD SECURITY AND VULNERABILITY**
SE १४. गएको १२ महिनामा कुनै महिना तपाईको परिवारको आवश्यकता अनुसार खाना नपुग्ने अवस्था थियो ? ○ थियो ○ थिएन	SE14	Over the last 12 months, were there any months in which you did not have enough food to meet your family's needs? ○ Yes ○ No
(यदि थिएन भने प्रश्न नं. SE १५ मा जानुहोस्)		***If no go to question SE15.***
SE १४.१ यदि थियो भने कुन महिनामा ? ☐ बैशाख ☐ जेष्ठ ☐ असार ☐ साउन ☐ भदौ ☐ असोज ☐ कार्तिक ☐ मसिर ☐ पुस ☐ माघ ☐ फागुन ☐ चैत	SE14. 1	If yes which months? ⌟ Baisakh (Apr – May) ⌟ Jyesth (May- Jun) ⌟ Asad (Jun – Jul) ⌟ Shrawan (Jul – Aug) ⌟ Bhadau (Aug – Sep) ⌟ Asoj (Sep – Oct) ⌟ Kaartik (Oct – Nov) ⌟ Mangsir (Nov – Dec) ⌟ Push (Dec – Jan) ⌟ Magh (Jan – Feb) ⌟ Phagun (Feb – Mar) ⌟ Chait (Mar – Apr)
SE १५. गएको २४ घण्टामा तपाई वा तपाइको परिवारले तलका मध्ये कुन कुन (घरमै बनाएको) खानेकुरा खानुभयो ? ☐ अन्न जस्तै : चामल, गहुँ, मकै, कोदो ☐ जरामा हुने जस्तै : आलु, तरुल, सखरखण्ड, पिडालु, ओल आदि ☐ तरकारीहरु : ☐ पहेलो तरकारीहरु जस्तै फर्सी, गाँजर आदि ☐ हरियो सागपातहरु ☐ फलफुलहरु : ☐ पहेलो जस्तै आँप तथा मेवा ☐ मासु : ☐ खसी ☐ कुखुरा ☐ हाँस ☐ रागां ☐ बंगुर ☐ मुसा ☐ गाई/गोरु ☐ अण्डा ☐ माछा/घोंगी : ☐ सानो माछा ☐ ठुलो माछा ☐ घोंगी/गँगटा ☐ दाल/गेडागुडी/बदाम ☐ दूध पदार्थहरु	SE15	In the last 24 hours which of the following foods did you or your family eat (i.e. foods that were eaten at home or made at home)? ⌟ Cereals e.g. rice, wheat, maize, millet, ⌟ Root tubers e.g. potatoes, yams, sweet potatoes, ⌟ Vegetables : ⌟ *yellow colour like pumpkin & carrots* ⌟ *green leaves* ⌟ Fruits : ⌟ *yellow like mango and papaya* ⌟ Meat: ⌟ *goat* ⌟ *chicken* ⌟ *duck* ⌟ *buffalo* ⌟ *pig* ⌟ *mouse / rat* ⌟ *cow / bull* ⌟ Eggs ⌟ Fish / shell fish: ⌟ *small fish with bones* ⌟ *large fish no bones* ⌟ *snails or crabs*

☐ तेल/चिल्लो पदार्थहरु ☐ चिनी/मह/मिठा ☐ अन्य जस्तै : मसला, चिया, कफी ☐ जाँड, रक्सी		⌟ Pulses & nuts ⌟ Dairy ⌟ Oil / fats ⌟ Sugar / honey ⌟ Other e.g. spices, tea, coffee ⌟ Alcohol
SE १६. तपाईको परिवारमा कुनै आपत विपतको वेला जस्तै खडेरी, अन्नबालीमा क्षति वा उत्पादनमा कमी, महामारी, ठूलो स्वास्थ्य समस्या, खर्च बढ्ने, असिना पर्ने, बाढी पहिरो जाने जस्ता समस्या आइपरेको वेला यस्तो स्थितिमा परिवारले कस्तो बैकल्पिक उपायहरु अपनाउनु भयो वा अपनाउनु हुन्छ ? ☐ बैक/बचत समूहबाट ऋण लिएर ☐ साहु/जमिन्दारबाट ऋण लिएर ☐ आफन्तबाट ऋण लिएर ☐ उधारोमा अन्न किनेर ☐ अन्न सापटी लिएर ☐ बैदेशिक रोजगार ☐ बच्चालाई अरुको घरमा राख्न पठाएर ☐ अन्य थप काम गरेर ☐ पुरै परिवार बसाई सरेर कहाँ (उल्लेख गर्नुहोस्) ..... ☐ अन्य (उल्लेख गर्नुहोस्)	SE16	If your family experienced a shock like a drought, a crop failure or drop in production, disease epidemic, a major health problem in your household, increased expenditure, hail, flood, landslide or other similar problem what would your household do to cope / what has it done to cope? ⌟ Loan from bank / savings organisation ⌟ Loan from landlord (zamindar) ⌟ Loan from relative ⌟ Buying food on credit ⌟ Borrowing food ⌟ Migratory labour ⌟ Sending children to stay with relatives ⌟ Taking on extra work ⌟ Whole household moving elsewhere specify where _____ ⌟ Other specify _____
SE १७. गएको १२ महिनामा तपाईको परिवारमा माथि भनिएको अनुसारको आपत विपतको स्थिति आइपरेको थियो ? ○ थियो ○ थिएन	SE17	Has your household experienced a shock during the last 12 months? ○ Yes ○ No
(यदि थिएन भने प्रश्न नं. SE १८ मा जानुहोस्)		***If no go to question SE18***
SE १७.१ यदि थियो भने के घटना घटेको थियो ? ☐ खडेरीले गर्दा अन्न बालीमा क्षति ☐ बाढीले खेत/बाली बगाउनु ☐ असिना परेर अन्न बालीमा क्षति ☐ किरा फट्याङ्गाले गर्दा अन्न बालीमा क्षति ☐ पहिरोले गर्दा खेत/बालीमा क्षति ☐ सितलहरले गर्द अन्न बालीमा क्षति ☐ हुरी वतासले गर्द अन्न बालीमा क्षति ☐ अन्य कारणले अन्न बालीमा क्षति ☐ बाढीले घर बगाउनु ☐ पहिरोले घर बगाउनु ☐ हुरी वतासले गर्दा घरमा क्षति ☐ आग लागि ☐ चोरि डकैती ☐ भुइंचालो/भुकम्प ☐ महामारी रोग लाग्ने	SE17. 1	If yes what happened? ⌟ Crop failed due to drought ⌟ Floods washed away fields / crops ⌟ Hail destroyed crops ⌟ Locust infestation destroyed crops ⌟ Landslide destroyed crops / fields ⌟ Fog destroyed crops ⌟ Wind / cyclone destroyed crops ⌟ Crop failure for other reason ⌟ Floods washed house away ⌟ Landslide destroyed house ⌟ Cyclone / hurricane (wind damage) to house ⌟ Fire ⌟ Theft ⌟ Earthquake ⌟ Disease epidemic

☐ सितलहरले गर्दा मान्छेहरु मरेको ☐ सितलहरले गर्दा गाई वस्तुहरु मरेको ☐ परिवारको २/३ जनाको मृत्यु भएको ☐ ठूलो स्वास्थ्यमा समस्या (उल्लेख गर्नुहोस्) ..... ☐ अन्य (उल्लेख गर्नुहोस्)		☐ Winter fog killed people ☐ Winter fog killed livestock ☐ 2 to 3 deaths of productive family members in your family in one year ☐ Major health problem: specify _____ ☐ Other specify _____
छोरा र छोरी समान हुन दुवैलाई स्कूल पठाउन पर्छ । (***यो वाक्य देखाउने)***		**For daughters and sons to be equal both should be sent to school.** ***(Show this sentence for the woman to read)***
शिक्षा		EDUCATION
SE १८. तपाई यो वाक्य पढ्न सक्नु हुन्छ ? ○ सजिलै पढ्न सक्ने ○ गाह्रो संग पढ्ने ○ पढ्न नसक्ने	SE18	Can you read this sentence? ○ Reads easily ○ Reads with difficulty ○ Cannot read
SE १९. तपाईले पढ्नु भएको छ ? ○ छ ○ छैन	SE19	Have you studied at all? ○ Yes ○ No
(यदि छैन भने प्रश्न नं. SE २० मा जानुहोस्)		***If no go to question SE20***
SE १९.१ तपाईले कति सम्म पढ्नु भएको छ ? .... कक्षा ○ प्रौढ शिक्षा ○ एस.एल.सी ○ प्र.प.तह ○ स्नातक वा सो भन्दा माथी ○ उर्दू	SE19. 1	If yes what is the highest grade that you studied to? Class No. __ __ ○ Non-formal education ○ SLC ○ Intermediate ○ Bachelors or above ○ Urdu _____
SE २०. तपाईको श्रीमानले पढ्नु भएको छ ? ○ छ ○ छैन	SE20	Has your husband studied? ○ Yes ○ No
(यदि छैन भने प्रश्न नं. SE २१. मा जानुहोस्)		***If no go to question SE21***
SE २०.१ तपाईको श्रीमानले कति सम्म पढ्नु भएको छ ? .... कक्षा ○ प्रौढ शिक्षा ○ एस.एल.सी ○ प्र.प.तह ○ स्नातक वा सो भन्दा माथी ○ उर्दू	SE20. 1	If yes what is the highest grade that your husband studied to? Class No. __ __ ○ Non-formal education ○ SLC ○ Intermediate ○ Bachelors or above ○ Urdu _____
SE २१. तपाईको बिवाह हुँदा तपाई कति वर्ष हुनुहुन्थ्यो ? .... वर्ष	SE21	How old were you when you got married? ___ ___ years

मिरा, धनुषा		MIRA DHANUSHA
GARIMA गरिमा प्रश्नावली : आमाको स्वास्थ्य स्याहार मोड्युल		**GARIMA questionnaire: MATERNAL CARE MODULE**
तलका अवस्थामा यो मोड्युल प्रयोग गर्नहोला - आमा र बच्चा २८ दिन सम्म जिवीतै भएमा - बच्चाको मृत्यु २८ दिन सम्म भएको र आमा जिउँदै भएको		*Use this module in the following situations:* - *Mother and baby alive at 28 days* - *Mother alive but baby dead at 28 days*
मिराको कर्मचारीले तपाईलाई यो भन्दा अगाडी आमाको स्वास्थ्य स्याहारको बरेमा सोध्नु भएको थियो ? ○ थियो ○ थिएन		Has a MIRA employee asked you about maternal care before? ○ Yes ○ No
यदि थियो भने कहा ? गा.वि.स. नं .... वडा नं. ..... टोल		If yes where? VDC No ___ ___ Ward no ___ Tole _____
यदि थियो भने कहिले ? साल .... महिना		If yes when? Year ____ ____ Month ___ ____
DATABASE IDENTIFICATION INFORMATION		**DATABASE IDENTIFICATION INFORMATION**
अन्तरवार्ता लिने व्यक्तिको आई डी नं.		INTERVIEWER ID. ___ ___
अन्तरवार्ता लिईएको मिति : .... गते .... महिना ..... साल		DATE OF INTERVIEW ___ ___ / ___ ___ / ___ ___ ___ ___
अवलोकन गरेको ☐		INTERVIEW OBSERVED ☐
युनीट अफीसमा चेक भएको ☐		CHECKED IN UNIT OFFICE ☐
अन्तरवार्ता भईसकेको धरमा गाएर चेक भएको ☐		CHECKED BY RE-VISITING HOUSE WHERE INTERVIEW TOOK PLACE ☐
घरमुलीको नाम		Name of household head _____
गा.वि.स. नं .... वडा नं. ..... टोल		VDC no ____ ____ Ward no ____ Tole _____
घरधुरी. नं		Household number ___ ___ ___ ___

MW को परिचय नं :		MW (married woman's) ID number ___ ___ ___ ___ ___ ___ ___
MW को नाम.....		MW (married woman's) name _____
MW को जन्म मिति : .... गते .... महिना ..... साल ***(यदि जन्म मिति थाहा छैन भने उमेर वर्षमा लेख्नुहोस्)*** MW को उमेर .... वर्ष		Date of birth of MW ___ ___ / ___ ___ / ___ ___ ___ ___ If you do not know the exact date of birth please give the Age of the MW ___ ___ years
BABY ID बच्चाको परिचय नं :		BABY ID number _____ ___ ___

अर्न्तवार्ताको लागी अनुमती लिएको ☐		PERMISSION GRANTED FOR THE INTERVIEW ☐
अर्न्तवार्ताको लागी अनुमती दिनेको सही अथवा औठाको छाप (त्याप्चे):		Signature or thumbprint of person granting permission _____
क. मुख्य उत्तरदाताको नाम :.....	a.	Name of main interviewee _____
ख. मुख्य उत्तरदाता संग MW को नाता	b.	Relationship to the married woman _____
ग. अन्य उत्तरदाताको नाम :	c.	Name of other interviewee _____
घ. अन्य उत्तरदाता संग MW को नाता	d.	Relationship of other interviewee to the married woman _____
ङ. अन्तर्वार्ताको समयमा को-को उपस्थित हुनुहुन्थ्यो ? ☐ MW ☐ सासु ☐ ससुरा ☐ श्रीमान् ☐ ससुराली घरको अन्य महिला ☐ आमा ☐ बुवा ☐ माइतीका अन्य महिला ☐ महिला छिमेकी ☐ महिला साथी ☐ पुरुष छिमेकी ☐ अन्य ।	e.	Who was present at the interview? ☐ MW married woman herself (to whom the interview refers) ☐ Mother-in-law ☐ Father-in-law ☐ Husband ☐ Other women from husband's household ☐ Mother ☐ Father ☐ Other women from the parental household ☐ Female neighbour ☐ Female Friend ☐ Male neighbour ☐ Other
पोषण		NUTRITION
M १. गर्भावस्थाको पहिलो ३/४ महिनाको समय र गर्भावस्था नभएको बेलाको तुलनामा, तपाईले सामान्यतया खाने मात्रा भन्दा बढी, कम वा उतीकै खाना खानुभयो ?	M1	Compared with when you were not pregnant did you eat less, more or the same amount during the first 3 to 4 months of your pregnancy?

○ बढी ○ कम ○ उस्तै		○ More ○ Less ○ The same
M २. गर्भावस्थाको अन्तीम ३/४ महिनाको समय र गर्भावस्था नभएको बेलाको तुलनामा, तपाईले सामान्यतया खाने मात्रा भन्दा बढी, कम वा उतीकै खाना खानुभयो ? ○ बढी ○ कम ○ उस्तै	M2	Compared with when you were not pregnant did you eat less, more or the same amount during the last 3 to 4 months of your pregnancy? ○ More ○ Less ○ The same
M ३. तपाई वा तपाईको बच्चाको स्वास्थ्यको लागी तपाईले गर्भावस्थाको बेलामा कुनै खानेकुरा वार्नु भएको थियो ? ○ वारेको थियो ○ वारेको थिएन	M3	Were there any foods that you did not eat because they would be bad for you or your baby's health during pregnancy? ○ Yes I avoided foods ○ No I didn't avoid foods
(यदि थिएन भने प्रश्न नं. M ४ मा जानुहोस्)		***If no go to question M4***
M ३.१ यदि थियो भने कुन खानेकुरा वार्नुभयो ? ⌊हरियो साग पात ⌊कुबिण्डो ⌊फर्सी ⌊भेण्टा वा बैगन ⌊भिण्डी ⌊सिमी ⌊तरुल ⌊आलु ⌊काउली ⌊मासु ⌊माछा ⌊अण्डा ⌊सुपाडी ⌊खेसारि दाल ⌊मसुरो दाल ⌊दुध ⌊दही ⌊तिल ⌊अदुवा ⌊मह ⌊पिरो ⌊फलफूल : ⌊बयर ⌊केरा ⌊आप ⌊ईमली ⌊कटहर ⌊अमिलो ⌊अन्य (उल्लेख गर्नुहोस्)	M3.1	If yes specify which foods you avoided? ⌋ green leaves ⌋ kubindo ⌋ pumpkin ⌋ aubergine ⌋ okra / bhindi ⌋ beans ⌋ yam ⌋ potato ⌋ cauliflower ⌋ meat ⌋ fish ⌋ eggs ⌋ betel nut ⌋ khesari lentils ⌋ red lentils ⌋ milk ⌋ yogurt ⌋ sesame ⌋ ginger ⌋ honey ⌋ chilli / hot ⌋ fruit : ⌋ bayar ⌋ banana ⌋ mango ⌋ tamarind ⌋ jackfruit ⌋ sour things ⌋ other (specify) _____
M ४. गर्भावस्थामा कुनै व्रत बस्नु भएको थियो ? ○ थियो ○ थिएन	M4	Did you fast during your pregnancy? ○ Yes ○ No
(यदि थिएन भने प्रश्न नं. M ५ मा जानुहोस्)		***If no go to question M5***
M ४.१ यदि थियो भने कति पटक बस्नुभएको थियो ? महिनाको .... पटक वा गर्भावस्थामा .... पटक वा रमजानमा .... दिन	M4.1	If yes how many times did you fast? ___ ___ times per month or ___ ___ times over the pregnancy or ___ ___ days during Ramadan
M ४.२ तपाईले व्रतको दिनमा सामान्यतया तलका मध्ये कुन कुन खानेकुरा खानुभयो ? ⌊ अन्न जस्तै : चामल, गहुँ, मकै, कोदो ☐सुजिको हलुवा ☐साबुदानाको खिर ☐चामल खिर ☐सेवई ⌊ जरामा हुने जस्तै : आलु, तरुल, सखरखण्ड, पिडालु, ओल आदि ⌊ तरकारीहरु : ⌊ पहेंलो तरकारीहरु जस्तै फर्सी, गाँजर आदि ⌊ हरियो सागपातहरु	M4.2	Which of the food listed below did you usually eat on a fasting day? ⌋ cereals e.g. rice, wheat, maize, millet, : ⌋ *semolina in ghee (halwa)* ⌋ *tapioca / sago pudding in milk* ⌋ *rice pudding* ⌋ *rice noodles* ⌋ root tubers e.g. potatoes, yams, sweet potatoes, ⌋ vegetables: ⌋ *yellow veg like pumpkin, carrots* ⌋ *green leaves*

☐ फलफुलहरु : ☐ पहेलो जस्तै आँप तथा मेवा ☐मखान ☐ मासु : ☐ खसी ☐ कुखुरा ☐ हाँस ☐ रागा ☐ बंगुर ☐ मुसा ☐ गाई/गोरु ☐ अण्डा ☐ माछा/घोंगी : ☐ सानो माछा ☐ ठुलो माछा ☐ घोंगी/गँगटा ☐ दाल/गेडागुडी/बदाम : ☐ममफली ☐ दूध पदार्थहरु ☐ तेल/चिल्लो पदार्थहरु ☐ चिनी/मह/मिठा/मिठाई ☐ अन्य जस्तै : मसला, चिया, कफी ☐ जाँड, रक्सी ☐ नुन		☐ fruits : ☐ *yellow colour like mango and papaya* ☐ *makhaan* ☐ meat : ☐ *goat* ☐ *chicken* ☐ *duck* ☐ *buffalo* ☐ *mouse / rat* ☐ *cow / bull* ☐ eggs ☐ fish or shell fish ☐ *small fish +bones* ☐ *large fish no bones* ☐ *snails / crabs* ☐ pulses & nuts : ☐ peanuts ☐ dairy ☐ oil / fats ☐ sugar / honey / raw sugar / sweets ☐ other e.g. spices, tea, coffee ☐ alcohol ☐ salt
M ४.३ तपाईले व्रतको दिनमा कति पटक खानु भयो ? ◯ १ पटक ◯ २ पटक ◯ ३ पटक ◯ ३ पटक भन्दा बढी	M4.3	How many times did you eat on a fasting day? ◯ 1 ◯ 2 ◯ 3 ◯ >3
M ५. सुत्केरी भएको पहिलो ५ दिनमा तपाईले कति मात्रामा पानी पिउनु भयो ? ◯ पिउन मन लागेको जति ◯ पिउन मन लागेको भन्दा कम ◯ पिउन मन लागेको भन्दा धेरै कम	M5	During the first 5 days after the birth how much water did you drink? ◯ As much as I wanted ◯ Less than I wanted ◯ Much less than I wanted
M ६. सुत्केरी भएको पहिलो ५ दिनमा तपाईले तलका मध्ये कुन कुन खानेकुरा खानुभयो ? ☐ अन्न जस्तै : चामल, गहुँ, मकै, कोदो ☐सुजिको हलुवा ☐भात ☐रोटी ☐ जरामा हुने जस्तै : आलु, तरुल, सखरखण्ड, पिडालु, ओल आदि ☐ तरकारीहरु : ☐ पहेलो तरकारीहरु जस्तै फर्सी, गाँजर आदि ☐ हरियो सागपातहरु ☐ फलफुलहरु : ☐ पहेलो जस्तै आँप तथा मेवा ☐ मासु : ☐ खसी ☐ कुखुरा ☐ हाँस ☐ रागा ☐ बंगुर ☐ मुसा ☐ गाई/गोरु ☐ अण्डा ☐ माछा/घोंगी : ☐ सानो माछा ☐ ठुलो माछा ☐ घोंगी/गँगटा ☐ दाल/गेडागुडी/बदाम ☐ दूध पदार्थहरु ☐ तेल/चिल्लो पदार्थहरु ☐ चिनी/मह/मिठा /गुड ☐ अन्य जस्तै : मसला, चिया, कफी ☐ जाँड, रक्सी	M6	During the first 5 days after the birth which of the following foods did you eat? ☐ cereals e.g. rice, wheat, maize, millet, ☐ semolina in ghee (halwa) ☐ boiled rice ☐ roti (wheat bread) ☐ root tubers e.g. potatoes, yams, sweet potatoes, ☐ vegetables ☐ *yellow veg like pumpkin, carrots* ☐ *green leaves* ☐ fruits ☐ *yellow colour like mango and papaya* ☐ meat ☐ *goat* ☐ *chicken* ☐ *duck* ☐ *buffalo* ☐ *mouse / rat* ☐ *cow / bull* ☐ eggs ☐ fish or shell fish ☐ *small fish with bones* ☐ *large fish no bones* ☐ *snails / crabs*

∟ नुन ∟ सुठौरा /जडीबुटीहरु र घिउ		⌟ pulses & nuts ⌟ dairy ⌟ oil / fats ⌟ sugar / honey / raw sugar ⌟ other e.g. spices, tea, coffee ⌟ alcohol ⌟ salt ⌟ 'sitauraa' – sweet herb and ghee preparation
M ७. तपाई वा तपाईको बच्चाको स्वास्थ्यको लागी तपाईले सुत्केरीको ६ दिन देखि २८ दिन भित्रको बेलामा कुनै खानेकुरा वार्नु भएको थियो ? ○ वारेको थियो ○ वारेको थिएन	M7	Were there any foods that you did not eat because they would be bad for you or your baby's health from 6 days to 28 days postpartum? ○ Yes I avoided foods ○ No I didn't avoid foods
(यदि थिएन भने प्रश्न नं. ५४ मा जानुहोस्)		***If no go to question M8***
M ७१ यदि थियो भने कुन खानेकुरा वार्नुभयो ? ∟हरियो साग पात ∟कुभिण्डो ∟फर्सी ∟भण्टा वा बैगन ∟भिण्डी ∟ओल ∟लौका ∟तरुल ∟मासु ∟माछा ∟अण्डा ∟भैसीको दुध ∟गाईको दुध ∟भैसीको दही ∟गाईको दही ∟दाल वा गेडागुडी ∟मास दाल ∟खेसारि दाल ∟मसुरो दाल ∟मह ∟पिरो ∟ भात वा रोटी ∟च्युरा ∟मुरही ∟कोदो ∟उखु ∟सरसो ∟सुपाडी ∟फलफूल ∟आप ∟कटहर ∟केरा ∟बयर ∟अम्बा ∟अमिलो ∟अन्य (उल्लेख गर्नुहोस्) ...	M7.1	If yes specify which foods you avoided? ⌟ green leaves ⌟ kubindo ⌟ pumpkin ⌟ aubergine ⌟ okra / bhindi ⌟ ol ⌟ louka ⌟ yam ⌟ meat ⌟ fish ⌟ eggs ⌟ buffalo milk ⌟ cow milk ⌟ buffalo yogurt ⌟ cow yogurt ⌟ lentils or pulses ⌟ black (urid) lentils ⌟ khesari lentils ⌟ red lentils ⌟ honey ⌟ chilli / hot ⌟ rice or roti ⌟ beaten rice ⌟ puffed rice ⌟ millet ⌟ sugar cane ⌟ mustard ⌟ betel nut ⌟ fruit ⌟ mango ⌟ ripe jackfruit ⌟ bananas ⌟ bayar ⌟ guava ⌟ sour things ⌟ other (specify) _____
M ८. बच्चा जन्मिएको कति दिन पछि नामाकरण (नाम राख्ने) गर्नु भयो ? .... दिन	M8	How many days after the birth did you have the naming ceremony? ____ _____ days
M ९. सुत्केरी नभएको र गर्भावस्था नभएको बेलाको तुलनामा, तपाईले सुत्केरी भएको पहिलो ५ दिनमा तपाईले सामान्यतया खाने मात्रा भन्दा बढी, कम वा उतीकै खाना नुभयो ? ○ बढी ○ कम ○ उस्तै	M9	Compared with when you were not pregnant and not postpartum did you eat less, more or the same during the first 5 days after the birth? ○ more ○ less ○ the same
M १०. गर्भावस्था नभएको बेलाको तुलनामा, तपाईले नामाकरण देखि २८ दिन भित्रको समयमा तपाईले सामान्यतया खाने मात्रा भन्दा बढी, कम वा उतीकै खाना खानुभयो ? ○ बढी ○ कम ○ उस्तै	M10	Compared with when you were not pregnant and not postpartum did you eat less, more or the same during the period between the naming ceremony and 28 days after the birth? ○ more ○ less ○ the same

स्वास्थ्य		HEALTH
M ११. तपाईले वा तपाईको श्रीमानले विगतमा कुनै परिवार नियोजनको अस्थाई साधन प्रयोग गर्नु भएको थियो ? ○ थियो ○ थिएन	M11	Have you or your husband ever used any temporary methods of family planning in the past? ○ Yes ○ No
(थिएन भने प्रश्न नं* M *१२ मा जानुहोस ।)		***If no go to question M12***
M ११.१ थियो भने कुन साधन प्रयोग गर्नु भएको थियो ? ☐ डि.पो ☐ नरपाल्न्ट ☐ पिल्स ☐ कपर टी ☐ कन्डम ☐ अन्य	M11.1	If you have, which methods have you used? ⌟ Depo provera ⌟ Norplant ⌟ Pills ⌟ Copper T ⌟ Condom ⌟ Other ___
M १२. तपाई यो भन्दा पहिला पनि गर्भवति हुन भएको थियो ? *(जुन गर्भपतन वा मृत वच्चा जन्मेको पनि हुन सक्छ)* ○ थियो ○ थिएन	M12	Had you ever been pregnant before now this recent pregnancy? (Including miscarriages and stillbirths.) ○ Yes ○ No
(यदि थिएन भने प्रश्न नं* M *१४ मा जानुहोस)		***If no go to question M14.***
विगतका गर्भावस्थाहरु :		PREVIOUS PREGNANCIES
पछिल्ला गर्भावस्था सम्वन्धी पूर्ण विवरण :		Full details of all previous pregnancies:
M १३. अव म तपाईलाई पछिल्ला गर्भावस्थाको वारेमा सोध्दैछु । जुन जिउँदै जन्मेको,जन्मदै मरेको, जन्मेर मरेको र गर्भखेर गएको वारेमा वताई दिनु होला । कृपया तपाईले आफ्नो पहिलो गर्भ देखी शुरु गर्नु होला ।	M13	Now I would like to ask you for the details of all your previous pregnancies. Please tell me about those who were born alive, born dead, died after birth and miscarriages. Please start from you first pregnancy.
हरेक वच्चाको वारेमा टेवलको एक एक रेखामा (लाइनमा) उल्लेख गर्नुहोस् ।		***[Please fill in the table repeating the questions for each pregnancy in turn.]***
M १३. क. यदी तपाईको यो वच्चा जुम्ल्याहा हो भने पहिलो वा दोस्रो जुम्ल्याहा वच्चा तलको टेबलमा लेख्नुहोस ।	M13 a	If it was a multiple pregnancy please write if this baby the first or second baby in the table below.
M १३. ख. यदी तपाईको यो वच्चा सात महिना भन्दा पहिले मृत जन्मेको (गर्भ खेर गएको) हो भने जन्म मिति तलको टेबलमा लेखेर अर्को वच्चामा जानुहोस ।	M13 b	If the baby was born dead before 7 months (Miscarriage) please write the date of miscarriage in the table below and move on to the next child.
M १३. ग. यदी तपाईको यो वच्चा सात महिनाको गर्भ भन्दा पछि मृत जन्मेको (स्टील वर्थ) हो भने जन्म मिति तलको टेबलमा लेखेर अर्को वच्चामा जानुहोस ।	M13 c	If the baby was born dead after 7 months (still birth) please write the date of the stillbirth in the table below and move on to the next child.
M १३. घ. यदी तपाईको यो वच्चा जिवित जन्मेको र हाल पनि जिवितै हो भने जन्म मिति, लिङ्ग र बच्चाको नाम तलको टेबलमा लेखेर अर्को वच्चामा जानुहोस ।	M13 d	If the baby was born alive and is still alive now please write the date of the birth, sex and baby's name in the table below and move on to the next child.

M १३. ङ यदी तपाईको यो वच्चा जिवित जन्मेको तर पछि मरेको हो भने जन्म मिति, लिङ्ग, मरेको मिती र बच्चाको नाम तलको टेबलमा लेखेर अर्को वच्चामा जानुहोस ।	M13 e	If the baby was born alive and but since died please write the date of the birth, sex, date of death and baby's name in the table below and move on to the next child.

	पहिलो वा दोस्रो लेख्नुहोस्	***एक एक बच्चाको लागी एउता कोसमा टिक लगाउनुहास्***				**मिति वा वर्ष लेख्नुहोस्**	***टिक लगाउनुहास्***		**मरेको मिति वा वर्ष लेख्नुहोस्**	**नाम लेख्नुहोस**
	Write first or second	***For each child tick one box***				**Write date or years ago**	***Tick box***		**Write date of death or years ago**	**Write name**
गर्भावस्था	तपाईको यो बच्चा जुम्ल्याहा हो ? यदी हो भने पहिलो वा दोस्रो तल लेख्नु होस	गर्भ खेर गएको (सात महिनाको गर्भ भन्दा पहिल मृत जन्मेको)	स्टील वर्थ (मृत जन्मेको सात महिना भन्दा पछि)	जिवित जन्मेको हाल पनि जिवितै	जिवित जन्मेको तर हाल मरेको	जन्म मिति वा गर्भ खेर गएको मिती वा मृत जन्मेको मिति अथवा घटना भएको कति वर्ष भयो	छोरा	छोरी	मरेको मिती अथवा घटना भएको कति वर्ष भयो	बच्चाको नाम
Pregnancy	Was the baby a twin or triplets? If yes write first second or third.	Miscarriage (born dead before 7 months)	Still Birth (born dead after 7 months)	Live Birth and still alive.	Live Birth but died later.	Date of birth, still birth or miscarriage or how many years ago the event occurred	Boy	Girl	Date of death or how many years ago the event occurred	Name of baby
१ 1										
२ 2										
३ 3										
.										
.										
.										
१४ 14										

पुर्व प्रसुती सेवा		ANTENATAL CARE
M १४. तपाईलाई गर्भावस्थामा महिला स्वास्थ्य स्वयम सेबिकाले भेट्न आउनु भएको थियो ? ○ थियो ○ थिएन	M14	Did the female community health volunteer (FCHV) come to visit you during your pregnancy? ○ Yes ○ No
M १५. तपाईले गर्भावस्थामा महिला स्वास्थ्य स्वयम सेबिकालाई आफैले भेट्न जानु भएको थियो ? ○ थियो ○ थिएन	M15	Did you go to meet the female community health volunteer (FCHV) yourself? ○ Yes ○ No
M १६. तपाईलाई महिला स्वास्थ्य स्वयम सेबिकाले आइरन चक्की दिनु भएको थियो ? ○ थियो ○ थिएन	M16	Did the female community health volunteer (FCHV) give you iron pills? ○ Yes ○ No
M १७. तपाईलाई महिला स्वास्थ्य स्वयम सेबिकाले पूर्व प्रसुतिको बारेमा सल्लाह दिनु भएको थियो ? ○ थियो ○ थिएन	M17	Did the female community health volunteer (FCHV) give you advice about antenatal care? ○ Yes ○ No
M १८. यो गर्भावस्थामा तपाई जचाउन जानु भयो ? ○ भयो ○ भएन	M18	During this pregnancy did you go for antenatal check-up? ○ Yes ○ No
(गए भने प्रश्न नं M १९ मा जानुहोस)		***If yes go to question M19***
M १८.१ गइन भने किन ? ○ अस्पताल टाढा भएर ○ समस्या नभएर ○ अन्य	M18.1	If you didn't go, why not? ○ The hospital is far away ○ There was no problem ○ Other _____
(अब प्रश्न नं M २६ मा जानुहोस)		***Now go to question M26***
M १९. पहिलो पटक किन जचाउनु भयो ? ○ समस्या भएर ○ सबै कुरा ठिक छ कि छैन भनेर ○ अन्य साथीसँग गएको अनि जचाएको	M19	Why did you go for a check-up the first time? ○ Because of a problem ○ To check everything was alright ○ Because other friends went and got checked
M २०. गर्भावस्थामा जचाउन कहाँ जानु भयो ?(ठाउं उल्लेख् गर्नुहोस) ☐ जनकपुर अचंल अस्पताल ☐ अन्य अस्पताल ..... ☐ प्रा.स्वा.के. ..... ☐ स्वास्थ्य चौकी ..... ☐ उप स्वास्थ्य चौकी ..... ☐ गाउँ घर क्लिनिक ..... ☐ मेडिकल कलेज ..... ☐ परिवार नियोजन संघ ..... ☐ निजी क्लिनिक/नर्सिङ्ग होम ..... ☐ औषधी पसल	M20	Where did you go for the check-up? *(Write the name / location)* ☐ Janakpur Zonal hospital ☐ Other hospital _____ ☐ Primary Health Care Centre _____ ☐ Health Post _____ ☐ Sub Health Post _____ ☐ Mobile village clinic _____ ☐ Medical college _____ ☐ Family planning association _____ ☐ Private clinic or hospital _____ ☐ Medical shop _____

☐ भारतको अस्पताल वा क्लिनिक ..... ☐ शिविर ..... ☐ आर्युवेदीक अस्पताल ..... ☐ अन्य		⌟ Indian hospital or clinic _____ ⌟ Health camp _____ ⌟ Ayurvedic hospital _____ ⌟ Other _____
M २१. कति महिनाको गर्भवती हुँदा पहिलो पल्ट जचाउन जानुभयो ? .... महिना	M21	How many months pregnant were you when you went for your first check-up? _____ _____ Months
M २२. कति पटक जचाउनु भयो ? ..... पटक	M22	How many times did you go for a check-up? _____ Times
M २३. यो गर्भावस्थामा तलका कृयाकलापहरु गरिएको थियो ?	M23	During this pregnancy were any of the following done at least once ?
M २३. क) तपाईलाई तौलिएको थियो ? ○ थियो ○ थिएन	M23 a	Were you weighed? ○ Yes ○ No
M २३. ख) तपाईको उचाई नापिएको थियो ? ○ थियो ○ थिएन	M23 b	Was your height measured? ○ Yes ○ No
M २३. ग) तपाईको रक्तचाप नापिएको थियो ? ○ थियो ○ थिएन	M23 c	Was your blood pressure measured? ○ Yes ○ No
M २३. घ) तपाईको पिसावको नमुना जाचिएको थियो ? ○ थियो ○ थिएन	M23 d	Did you give a urine sample? ○ Yes ○ No
M २३. ङ) तपाईको रगतको नमुना जाचिएको थियो ? ○ थियो ○ थिएन	M23 e	Did you give a blood sample? ○ Yes ○ No
M २३. च) स्वास्थ्य कार्यकर्ताले तपाईलाई वच्चा बसेको अवस्थावारे राम्रोसँग जाँच्नु भयो /हेर्नुभएको थियो ? ○ थियो ○ थिएन	M23 f	Did the health worker get you to lie down and feel the position of the baby? ○ Yes ○ No
M २४. तपाईलाई गर्भावस्थाको जटिलताको बारेमा केही भनिएको थियो ? ○ थियो ○ थिएन	M24	Were you told anything about complications in pregnancy? ○ Yes ○ No
M २५. यदि तपाईलाई गर्भावस्थामा जटिलता देखा परेमा कही जानु पर्छ भनेर भनेको थियो ? ○ थियो ○ थिएन ○ थाहा छैन	M25	Were you told where to go if you had any complications? ○ Yes ○ No ○ Don't know
M २६. तपाईले यस गर्भावस्थामा टि.टि. सुई लिनु भएको थियो ? ○ थियो ○ थिएन ○ थाहा छैन	M26	Did you get a tetanus injection during this pregnancy? ○ Yes ○ No ○ Don't know
M २७. यो गर्भावस्थामा तपाईलाई आइरन चक्की दिइयो वा किन्नु भयो ? ○ दिइयो ○ किने ○ थाहा छैन ○ खाईन ○ किने/दिइयो	M27	During this pregnancy were you given or did you buy iron tablets ? ○ Given ○ Bought ○ Don't know ○ Didn't take ○ Both bought & given
(यदि खाईन भने प्रश्न नं M २८ मा जानुहोस)		***If didn't take iron go to question M28***

M २७.१ यस गर्भावस्था भरी कति दिन चक्की खानु भयो ? .... दिन ○ थाहा छैन	M27.1	During this pregnancy how many days in total did you take iron tablets ? _____ _____ _____ days ○ Don't know
M २८. यो गर्भावस्थामा तपाईलाई भिटामिनको झोल दिइयो वा किन्नु भयो ? ○ दिइयो ○ किने ○ थाहा छैन ○ खाईन ○ किने/दिइयो	M28	During this pregnancy were you given or did you buy multivitamin syrup? ○ Given ○ Bought ○ Don't know ○ Didn't take ○ Both bought & given
(यदि खाईन भने प्रश्न नं M २९ मा जानुहोस)		***If didn't take iron go to question M29***
M २८.१ यस गर्भावस्था भरी कति दिन भिटामिन झोल खानु भयो ? .... दिन ○ थाहा छैन	M28.1	During this pregnancy how many days in total did you take multivitamin syrup ? _____ _____ _____ days ○ Don't know
M २९. तपाईलाई सुत्केरी सामाग्रीको बारेमा थाहा छ ? ○ छ ○ छैन ***(सुत्केरी सामाग्री देखाउने)***	M29	Do you know about safe delivery kits? ○ Yes ○ No ***(Show a safe delivery kit)***
(छैन भने प्रश्न नं ८१ मा जानुहोस)		***If no go to question M31***
M ३०. सुत्केरी सामाग्रीको बारेमा कसरी थाहा पाउनु भयो ? ⌴ रेडियो/टि.भी.मा ⌴ स्वास्थ्य संस्थामा ⌴ म.स्वा.स्व.सेविका बाट ⌴ औषधी पसलमा ⌴ पत्रपत्रिकामा ⌴ आमा समूहमा ⌴ छिमेकी / साथी ⌴ अन्य ..... खुलाउनुहोस	M30	How did you hear about safe delivery kits? ⌟ Radio / TV ⌟ Health institution ⌟ FCHV ⌟ Medical shop ⌟ Newspaper ⌟ Mother's group ⌟ Neighbour / friend ⌟ Other _____
समस्याहरु		PROBLEMS DURING PREGNANCY
M ३१. तपाईलाई गर्भावस्था वा सुत्केरी अवस्थामा कुनै समस्या थियो ? ○ थियो ○ थिएन	M31	Did you have any problems during pregnancy and postpartum? ○ Yes ○ No
(यदि थिएन भने प्रश्न नं M ६७ मा जानुहोस्)		***If no go to question M67***
M ३२. समस्या सामान्य वा खतरायुक्त थियो ? ⌴ सामान्य ⌴ खतरायुक्त	M32	Was the problem serious or common (normal)? ⌟ Serious ⌟ Common
सामान्य समस्या		'NORMAL' PROBLEMS DURING PREGNANCY
M ३३. तपाईलाई तलको मध्य कुनै समस्या थियो ? ○ टाउको दुख्नु, कब्जियत, वाक वाक लाग्नु, ढाड दुख्नु, कमजोरी हुनु, पेट फुल्नु, अपाच्य हुनु, हातखुट्टा फर्किनु, चिलाउनु, झाडा पखाला लाग्नु, पेट दुख्नु, पानी वग्नु, पिसाव पोल्नु,	M33	Did you have any of the problems listed below? ○ Headache, constipation, nausea, backache, weakness, swollen stomach, indigestion, cramp in hands and feet, itching, diarrhoea, stomach ache,

हलुका हात खुट्टा फुल्नु (तर मुख नफुल्नु) ○ रतन्धो ○ दैनिकी घरको कार्य गर्दा पनि सास बढ्नु ○ दुध गान्नीनु ○ अन्य.....		vaginal discharge, burning on urination, slight swelling of hands and feet (but not of face) ○ Nightblindness ○ Breathlessness in course of everyday activities ○ Painful swollen breasts ○ Other _____
M ३४. सामान्य समस्या हुँदा तपाईले कुनै उपचार गराउनु भयो ? ○ भयो ○ भएन	M34	When you had a 'normal' problem, did you get any treatment? ○ Yes ○ No
M ३४.१ यदि गराइन भने किन ?	M34.1	If no, why not? _____
(यदि खतरायुक्त समस्या मा उपचार लिएको तर सामान्य समस्यामा उपचार नलिएको भए पनि प्रश्न नं. M ५० जानुहोस्)		***If you took treatment for dangerous problems but not for normal problems go to question no M50***
M ३५. बिरामी भएपछि कोसँग सबभन्दा पहिला सम्पर्क गर्नु भयो ? ***(एक जनामा मात्र चिन्ह लगाउनुहोस् जो संग तपाईले सबभन्द पहिला सम्पर्क गर्नु भयो)*** ○ डाक्टर ○ स्टाफ नर्स ○ हे.अ ○ अ.न.मी ○ अ.हे.व ○ मा.शि.का ○ ग्र.स्वा.का ○ म.स्वा.स्व सेविका ○ सुडेनी ○ धामी झाकी ○ औषधी पसले ○ गाउंको प्राक्टिस्नर ○ अन्य	M35	Who did you consult first of all after you were ill? ***Please indicate only one person who you met first*** ○ Doctor ○ Staff nurse ○ Health Assistant ○ Auxilliary Nurse Midwife ○ MCHW ○ VHW ○ FCHV ○ Traditional Birth Attendants ○ Shaman (Dhami Jhangri) ○ Medicine shop ○ Village 'practitioner' ○ Other _____
M ३६. विरमी भएको कति समय पछि तपाईले पहिलो पटक उपचार गराउनु पर्छ भन्ने निर्णय गर्नु भयो ? .... घण्टा पछि वा .... दिन पछि ○ थाहा छैन	M36	How long after you became ill did you decide to seek care? ____ ____ Hours ____ ____Days ○ Don't know
M ३७. पहिलो पटक उपचार गराउन कहाँ जानुभयो ? (ठाउं उल्लेख गर्नुहोस) ○ जनकपुर अचंल अस्पताल ○ अन्य अस्पताल ..... ○ प्रा.स्वा.के. ..... ○ स्वास्थ्य चौकी ..... ○ उप स्वास्थ्य चौकी ..... ○ गाउँ घर क्लिनिक ..... ○ मेडिकल कलेज ..... ○ परिवार नियोजन संघ ..... ○ निजी क्लिनिक/नर्सिङ्ग होम ..... ○ आर्युवेदीक अस्पताल	M37	Where did you go for first treatment? (write the name of the institution) ○ Janakpur zonal hospital ○ Other hospital _____ ○ Primary Health Care Centre _____ ○ Health Post _____ ○ Sub Health Post _____ ○ Mobile Village Clinic _____ ○ Medical college _____ ○ Family Planning Association _____ ○ Private clinic / nursing home _____ ○ Ayurvedic hospital _____

..... ○ औषधी पसल ..... ○ भारतको अस्पताल वा क्लिनिक ..... ○ शिविर ..... ○ धामी झांक्रीको घर ..... ○ अन्य .... ○ स्वास्थ्य कार्यकर्तालाई घरमा वोलाएर		○ Medicine shop _____ ○ Indian hospital or clinic _____ ○ Health camp _____ ○ Shaman's (Dhami jhangri's) house ____ ○ Other _____ ○ Called health worker to the house
(यदि घरमा नै वोलाएको भए प्रश्न नं. M ४२ मा जानुहोस)		***If called health worker to the house go to question M42.***
M ३८. त्यहाँ पुग्नको लागी तपाईले कुन साधान बढी प्रयोग गर्नु भयो ? ○ हिडेर ○ बोकेर ○ एम्वुलेन्स ○ कार/टेम्पो/बस/ट्रयाक्टर ○ रिक्सा ○ साइकल ○ मोटरसाइकल ○ स्ट्रेचर ○ रेल ○ वयल/टायर गाडा/टाँगा ○ साइकल एम्वुलेन्स	M38	Which form of transport did you use the most to get there? ○ Walking ○ Carried ○ Ambulance ○ Car / tempo / Bus / tractor ○ Rickshaw ○ Cycle ○ Motorcycle ○ Stretcher ○ Rail ○ Ox cart or horse trap ○ Cycle ambulance
(यदि एउटा मात्र साधान प्रयोग भएको भए प्रश्न नं. M ४० मा जानुहोस)		***If used only one type of transport go to question M40.***
M ३९. माथीको साधान बाहेक अन्य कुन कुन साधान प्रयोग गर्नु भयो ? ☐ हिडेर ☐ बोकेर ☐ एम्वुलेन्स ☐ कार/टेम्पो/बस/ट्रयाक्टर ☐ रिक्सा ☐ साइकल ☐ मोटरसाइकल ☐ स्ट्रेचर ☐ रेल ☐ वयल/टायर गाडा/टाँगा ☐ साइकल एम्वुलेन्स	M39	Aside from the form of transport above what other means of transport did you use to get there? ☐ Walking ☐ Carried ☐ Ambulance ☐ Car / tempo / Bus / tractor ☐ Rickshaw ☐ Cycle ☐ Motorcycle ☐ Stretcher ☐ Rail ☐ Ox cart or horse trap ☐ Cycle ambulance
M ४०. विरमी भएको कति समय पछि त्यहाँ पुग्नभयो ? .... घण्टा वा ..... दिन म्यलुत पलयध्य ○ थाहा छैन	M40	How long after becoming ill did you get there? _____ hours _____ days ○ Don't know
M ४१. त्यहाँ पुगेको कति समय पछि उपचार पाउनु भयो ? .... घण्टा वा ..... दिन म्यलुत पलयध्य ○ थाहा छैन	M41	How long after getting there did you get treatment? _____ minutes _____ hours ○ Don't know
M ४२. त्यसपछि अर्को ठाउँमा पनि उपचारको लागि जानुभयो ? ○ भयो ○ भएन	M42	After this did you go somewhere else for treatment? ○ Yes ○ No
(यदि गइन भने प्रश्न नं. M ५० मा जानुहोस)		***If no go to question M50.***
M ४३. यदि जानुभयो भने तपाईलाई कसैले त्यहाँ जानु भनेर जानु भएको हो कि आफै जानु भएको हो ?	M43	If you went somewhere else, did you go because someone told you to or because you thought you should go yourself?

○ जानु भनेर ○ आफै		○ Someone told me to (referred) ○ Decided to go for self
M ४४. विरमी भएको कति समय पछि तपाईले दोस्रो पटक उपचार गराउनु पर्छ भन्ने निर्णय गर्नु भयो ? .... घण्टा वा ..... दिन म्यलुत पलयध ○ थाहा छैन	M44	How long after you became ill did you decide to seek care a second time? ____ ____ Hours ____ ____ Days ○ Don't know
M ४५. कहाँ जानु भयो ? (ठाउं उल्लेख गर्नुहोस) ○ जनकपुर अचल अस्पताल ○ अन्य अस्पताल ..... ○ प्रा.स्वा.के. ..... ○ स्वास्थ्य चौकी ..... ○ उप स्वास्थ्य चौकी ..... ○ गाउँ घर क्लिनिक ..... ○ मेडिकल कलेज ..... ○ परिवार नियोजन संघ ..... ○ निजी क्लिनिक/नर्सिङ्ग होम ..... ○ आर्युवेदीक अस्पताल ..... ○ औषधी पसल ..... ○ भारतको अस्पताल वा क्लिनिक ..... ○ शिविर ..... ○ धामी झांकीका घर ..... ○ अन्य ..... ○ स्वास्थ्य कार्यकर्तालाई घरमा वोलाएर	M45	Where did you go for second treatment? (write the name of the place) ○ Janakpur zonal hospital ○ Other hospital _____ ○ Primary Health Care Centre _____ ○ Health Post _____ ○ Sub Health Post _____ ○ Mobile Village Clinic _____ ○ Medical college _____ ○ Family Planning Association _____ ○ Private clinic / nursing home _____ ○ Ayurvedic hospital _____ ○ Medicine shop _____ ○ Indian hospital or clinic _____ ○ Health camp _____ ○ Shaman's (Dhami jhangri's) house ____ ○ Other _____ ○ Called health worker to the house
(यदि घरमा नै वोलाएको भए प्रश्न नं. M ५० मा जानुहोस)		***If called the health worker to the house go to question M50***
M ४६. त्यहाँ पुग्नको लागी तपाईले कुन साधान बढी प्रयोग गर्नु भयो ? ○ हिडेर ○ बोकेर ○ एम्वुलेन्स ○ कार/टेम्पो/बस/ट्र्याक्टर ○ रिक्सा ○ साइकल ○ मोटरसाइकल ○ स्ट्रेचर ○ रेल ○ वयल/टायर गाडा/टाँगा ○ साइकल एम्वुलेन्स	M46	Which form of transport did you use the most to get there? ○ Walking ○ Carried ○ Ambulance ○ Car / tempo / Bus / tractor ○ Rickshaw ○ Cycle ○ Motorcycle ○ Stretcher ○ Rail ○ Ox cart or horse trap ○ Cycle ambulance
M ४७. माथीको साधान बाहेक अन्य कुन कुन साधान प्रयोग गर्नु भयो ? □ हिडेर □ बोकेर □ एम्वुलेन्स □ कार/टेम्पो/बस/ट्र्याक्टर □ रिक्सा □ साइकल □ मोटरसाइकल □ स्ट्रेचर □ रेल	M47	Aside from the form of transport above what other means of transport did you use to get there? □ Walking □ Carried □ Ambulance □ Car / tempo / Bus / tractor □ Rickshaw □ Cycle □ Motorcycle

☐ वयल/टायर गाडा/टाँगा ☐ साइकल एम्बुलेन्स		⌟ Stretcher ⌟ Rail ⌟ Ox cart or horse trap ⌟ Cycle ambulance
M ४८. विरमी भएको कति समय पछि त्यहाँ पुग्नभया ? .... घण्टा वा .... दिन ○ थाहा छैन	M48	How long after becoming ill did you get there? ___ ___ hours ___ ___ days ○ Don't know
M ४९. त्यहाँ पुगेको कति समय पछि उपचार पाउनु भया ? .... घण्टा वा .... दिन ○ थाहा छैन	M49	How long long after reaching there did you get treatment? ___ ___ minutes ___ ___ hours ○ Don't know
खतरायुक्त समस्या		**DANGEROUS / SERIOUS PROBLEMS**
M ५०. तपाईलाई तलको मध्य कुनै समस्या थियो ?	M50	Did you have any of the problems listed below?
M ५०. क. गर्भावस्थामा तथा वच्चा जन्मनु भन्दा पहिला प्रसस्त रगत वग्यो ? ○ थियो ○ थिएन	M50 a	Any vaginal bleeding during pregnancy, before delivery? ○ Yes ○ No
M ५०. ख. वच्चा जन्मी सके पछि मरिन्छु कि जस्तो गरी अत्याधिक रक्तश्राव (ब्लिडिङ्ग) भएको ? ○ थियो ○ थिएन	M50 b	Heavy vaginal bleeding after delivery, so much that you might have died? ○ Yes ○ No
M ५०. ग. कम्पन, वेहोस हुनु, हातखुट्टा बेस्सरी काम्नु ? ○ थियो ○ थिएन	M50 c	Fit / Convulsion: unconscious, severe jerking arms & legs? ○ Yes ○ No
M ५०. घ. अवरोधयुक्त व्यथा लाग्नु / वच्चा अड्कीनु ? ○ थियो ○ थिएन	M50 d	Obstructed labour / baby stuck? ○ Yes ○ No
M ५०. ङ. लामो समय सम्म साल अड्कीनु ? ○ थियो ○ थिएन	M50 e	Placenta stuck, not coming out for a long time? ○ Yes ○ No
M ५०. च. अत्याधिक मात्रामा ज्वरो आउनु ? ○ थियो ○ थिएन	M50 f	Very high fever? ○ Yes ○ No
M ५०. छ. हात, खुट्टा र मुख सुन्नीनु ? ○ थियो ○ थिएन	M50 g	Swollen face, hands and feet? ○ Yes ○ No
M ५०. ज. अन्य	M50 h	Other _____
(खतरायुक्त समस्या छैन भने प्रश्न नं. M ६७ मा जानुहोस)		***If you had no dangerous/ serious problems go to question M67***
M ५१. खतरायुक्त समस्या हुँदा तपाईले कुनै उपचार गराउनु भयो ? ○ भयो ○ भएन	M51	When you had a 'serious' problem, did you get any treatment? ○ Yes ○ No

M ५१.१ यदि गरिन भने किन ?	M51.1	If no, why not? _____
(उपचार गराउनु भएन भने प्रश्न नं. M ६७ मा जानुहोस)		***If you did not get treatment for serious problems go to question no M67***
M ५२. बिरामी भएपछि कोसँग सवभन्दा पहिला सम्पर्क गर्नु भयो ? ***(एक जनामा मात्र चिन्ह लगाउनुहोस् जो संग तपाईले सबभन्द पहिला सम्पर्क गर्नु भयो)*** ○ डाक्टर ○ स्टाफ नर्स ○ हे.अ ○ अ.न.मी ○ अ.हे.व ○ मा.शि.का ○ ग्र.स्वा.का ○ म.स्वा.स्व सेविका ○ सुडेनी ○ धामी झांक्री ○ औषधी पसले ○ गाउंको प्राक्टिस्नर ○ अन्य.....	M52	Who did you consult first of all after you were ill? ***Please indicate only one person who you met first*** ○ Doctor ○ Staff nurse ○ Health Assistant ○ Auxilliary Nurse Midwife ○ MCHW ○ VHW ○ FCHV ○ Traditional Birth Attendants ○ Shaman (Dhami Jhangri) ○ Medicine shop ○ Village 'practitioner' ○ Other _____
M ५३. बिरमी भएको कति समय पछि तपाईले पहिलो पटक उपचार गराउनु पर्छ भन्ने निर्णय गर्नु भयो ? .... घण्टा पछि वा .... दिन पछि ○ थाहा छैन	M53	How long after you became ill did you decide to seek care? ____ ____ Hours ____ ____Days ○ Don't know
M ५४. पहिलो पटक उपचार गराउन कहाँ जानुभयो ? (ठाउं उल्लेख गर्नुहोस) ○ जनकपुर अचंल अस्पताल ○ अन्य अस्पताल ..... ○ प्रा.स्वा.के. ..... ○ स्वास्थ्य चौकी ..... ○ उप स्वास्थ्य चौकी ..... ○ गाउँ घर क्लिनिक ..... ○ मेडिकल कलेज ..... ○ परिवार नियोजन संघ ..... ○ निजी क्लिनिक/नर्सिङ्ग होम ..... ○ आर्युवेदीक अस्पताल ..... ○ औषधी पसल ..... ○ भारतको अस्पताल वा क्लिनिक ..... ○ शिविर ..... ○ धामी झांक्रीको घर ..... ○ अन्य ..... ○ स्वास्थ्य कार्यकर्तालाई घरमा वोलाएर	M54	Where did you go first for treatment? (write name of place) ○ Janakpur zonal hospital ○ Other hospital _____ ○ Primary Health Care Centre _____ ○ Health Post _____ ○ Sub Health Post _____ ○ Mobile Village Clinic _____ ○ Medical college _____ ○ Family Planning Association _____ ○ Private clinic / nursing home _____ ○ Ayurvedic hospital _____ ○ Medicine shop _____ ○ Indian hospital or clinic _____ ○ Health camp _____ ○ Shaman's (Dhami jhangri's) house ____ ○ Other _____ ○ Called health worker to the house
(यदि घरमा नै वोलाएको भए प्रश्न नं. M ५९ मा जानुहोस)		***If called health worker to the house go to question M59.***

M ५५. त्यहाँ पुग्नको लागी तपाईले कुन साधान बढी प्रयोग गर्नु भयो ? ○ हिडेर ○ बोकेर ○ एम्वुलेन्स ○ कार/टेम्पो/बस/ट्रयाक्टर ○ रिक्सा ○ साइकल ○ मोटरसाइकल ○ स्ट्रेचर ○ रेल ○ बयल/टायर गाडा/टाँगा ○ साइकल एम्वुलेन्स	M55	Which form of transport did you use the most to get there? ○ Walking ○ Carried ○ Ambulance ○ Car / tempo / Bus / tractor ○ Rickshaw ○ Cycle ○ Motorcycle ○ Stretcher ○ Rail ○ Ox cart or horse trap ○ Cycle ambulance
(यदि एउटा मात्र साधान प्रयोग भएको भए प्रश्न नं. M ५७ मा जानुहोस)		***If used only one type of transport go to question M57***
M ५६. माथीको साधान बाहेक अन्य कुन कुन साधान प्रयोग गर्नु भयो ? ⊔ हिडेर ⊔ बोकेर ⊔ एम्वुलेन्स ⊔ कार/टेम्पो/बस/ट्रयाक्टर ⊔ रिक्सा ⊔ साइकल ⊔ मोटरसाइकल ⊔ स्ट्रेचर ⊔ रेल ⊔ बयल/टायर गाडा/टाँगा ⊔ साइकल एम्वुलेन्स	M56	Aside from the form of transport above what other means of transport did you use to get there? ⊔ Walking ⊔ Carried ⊔ Ambulance ⊔ Car / tempo / Bus / tractor ⊔ Rickshaw ⊔ Cycle ⊔ Motorcycle ⊔ Stretcher ⊔ Rail ⊔ Ox cart or horse trap ⊔ Cycle ambulance
M ५७. विरमी भएको कति समय पछि त्यहाँ पुग्नभयो ? .... घण्टा वा ..... दिन म्यलुत पलयध ○ थाहा छैन	M57	How long after becoming ill did you get there? _____ hours _____ days ○ Don't know
M ५८. त्यहाँ पुगेको कति समय पछि उपचार पाउनु भयो ? .... घण्टा वा ..... दिन म्यलुत पलयध ○ थाहा छैन	M58	How long after getting there did you get treatment? _____ minutes _____ hours ○ Don't know
M ५९. त्यसपछि अर्को ठाउँमा पनि उपचारको लागि जानुभयो ? ○ भयो ○ भएन	M59	After this did you go somewhere else for treatment? ○ Yes ○ No
(यदि गइन भने प्रश्न नं. M ६७ जानुहोस)		***If no go to question M67.***
M ६०. यदि जानुभयो भने तपाईलाई कसैले त्यहाँ जानु भनेर जानु भएको हो कि आफै जानु भएको हो ? ○ जानु भनेर ○ आफै	M60	If you went somewhere else did you go because someone told you to or because you thought you should go yourself? ○ Someone told me to (referred) ○ Decided to go for self
M ६१. विरमी भएको कति समय पछि तपाईले दोस्रो पटक उपचार गराउनु पर्छ भन्ने निर्णय गर्नु भयो ? .... घण्टा वा ..... दिन म्यलुत पलयध ○ थाहा छैन	M61	How long after you became ill did you decide to seek care a second time? _____ Hours _____ Days ○ Don't know
M ६२. कहाँ जानु भयो ? (ठाउं उल्लेख गर्नुहोस) ○ जनकपुर अचल अस्पताल ○ अन्य अस्पताल ..... ○ प्रा.स्वा.के. ..... ○ स्वास्थ्य चौकी	M62	Where did you go? (write the name of the place) ○ Janakpur zonal hospital ○ Other hospital _____ ○ Primary Health Care Centre _____ ○ Health Post _____ ○ Sub Health Post _____ ○ Mobile Village Clinic _____

○ उप स्वास्थ्य चौकी ..... ○ गाउँ घर क्लिनिक ..... ○ मेडिकल कलेज ..... ○ परिवार नियोजन सघ ..... ○ निजी क्लिनिक/नर्सिङ्ग होम ..... ○ आर्युवेदीक अस्पताल ..... ○ औषधी पसल ..... ○ भारतको अस्पताल वा क्लिनिक ..... ○ शिविर ..... ○ धामी झांक्रीको घर ..... ○ अन्य ..... ○ स्वास्थ्य कार्यकर्तालाई घरमा वोलाएर		○ Medical college _____ ○ Family Planning Association _____ ○ Private clinic / nursing home _____ ○ Ayurvedic hospital _____ ○ Medicine shop _____ ○ Indian hospital or clinic _____ ○ Health camp _____ ○ Shaman's (Dhami jhangri's) house ____ ○ Other _____ ○ Called health worker to the house
(यदि घरमा नै वोलाएको भए प्रश्न नं. M६७ मा जानुहोस)		***If called the health worker to the house go to question M67***
M ६३. त्यहाँ पुग्नको लागी तपाईले कुन साधान बढी प्रयोग गर्नु भयो ? ○ हिडेर ○ बोकेर ○ एम्वुलेन्स ○ कार/टेम्पो/बस/ट्र्याक्टर ○ रिक्सा ○ साइकल ○ मोटरसाइकल ○ स्ट्रेचर ○ रेल ○ वयल/टायर गाडा/टाँगा ○ साइकल एम्वुलेन्स	M63	Which form of transport did you use the most to get there? ○ Walking ○ Carried ○ Ambulance ○ Car / tempo / Bus / tractor ○ Rickshaw ○ Cycle ○ Motorcycle ○ Stretcher ○ Rail ○ Ox cart or horse trap ○ Cycle ambulance
M ६४. माथीको साधान बाहेक अन्य कुन कुन साधान प्रयोग गर्नु भयो ? ☐ हिडेर ☐ बोकेर ☐ एम्वुलेन्स ☐ कार/टेम्पो/बस/ट्र्याक्टर ☐ रिक्सा ☐ साइकल ☐ मोटरसाइकल ☐ स्ट्रेचर ☐ रेल ☐ वयल/टायर गाडा/टाँगा ☐ साइकल एम्वुलेन्स	M64	Aside from the form of transport above what other means of transport did you use to get there? ☐ Walking ☐ Carried ☐ Ambulance ☐ Car / tempo / Bus / tractor ☐ Rickshaw ☐ Cycle ☐ Motorcycle ☐ Stretcher ☐ Rail ☐ Ox cart or horse trap ☐ Cycle ambulance
M ६५. विरमी भएको कति समय पछि त्यहाँ पुग्नभया ? .... घण्टा वा .... दिन ○ थाहा छैन	M65	How long after becoming ill did you get there? ___ ___ hours ___ ___ days ○ Don't know
M ६६. त्यहाँ पुगेको कति समय पछि उपचार पाउनु भया ? .... घण्टा वा .... दिन ○ थाहा छैन	M66	How long long after reaching there did you get treatment? ___ ___ minutes ___ ___ hours ○ Don't know
M ६७. जम्मा जम्मी उपचार (सामान्य र खतरायुक्त), यातायात र सत्केरी खर्चको लागि	M67	For treatment of both normal and complicated / serious conditions, transport

कति खर्च गर्नु भयो ? रु		and for your delivery how much did you spend in total? Rs _____
M ६८. खर्च कसरी जुटाउनु भयो ? ❑ ज्यालाबाट ❑ वचतबाट ❑ जमिन वेचेर ❑ बस्तुभाउ वेचेर ❑ नातेदारबाट सापटी लिएर ❑ साहुसंग सापटी वा ऋिण लिएर ❑ अन्य कोषबाट सापटी लिएर ❑ अन्य संस्थाबाट ❑ माइति घरबाट ❑ चन्दा दानबाट ❑ अन्न बेचेर ❑ गहना बेचेर	M68	How did you raise the money? ❑ Labour ❑ Savings ❑ Selling land ❑ Selling livestock ❑ Loan from relatives ❑ Loan from landlord ❑ Loan from savngs fund ❑ From another organization ❑ From parental home (maiti) ❑ Donations ❑ Selling grain ❑ Selling jewellery
M ६९. २४ घण्टा भन्दा लामो समय व्यथा लागेको थियो ? ○ थियो ○ थिएन	M69	Were you in labour more than 24 hours? ○ Yes ○ No
M ७०. सुत्केरी भई सकेपछि तपाईले जाँच गराउनु भएको थियो ? ○ थियो ○ थिएन	M70	After delivery did you get a check-up? ○ Yes ○ No
(यदि थियो भने प्रश्न नं. M ७२ मा जानुहोस् ।)		***If no go to question 72***
M ७१. यदि थिएन भने किन ? ○ जानुपर्छ भनेर थाहा थिएन ○ आवश्यक थिएन ○ अन्य करण (उलेख गर्नुहोस)	M71	If no why not? ○ Didn't know you should go ○ No need ○ Other reason _____
(यदि थिएन भने प्रश्न नं. M ७४ मा जानुहोस् ।)		***If no go to question 74***
M ७२. यदि जाँच गराएको भए, कति दिन पछि गराउनु भयो ? .... दिन	M72	If you got a check up, how many days after delivery was it? __ __ days
M ७३. को संग जचाउनु भयो ? ○ डाक्टर ○ स्टाफ नर्स ○ हे.अ ○ अ.न.मी ○ अ.हे.व ○ मा.शि.का ○ ग्र.स्वा.का ○ म.स्वा.स्व सेविका ○ सुडेनी ○ धामी झांक्री ○ औषधी पसले ○ गाउंको प्राक्टिस्नर ○ अन्य.....	M73	Who examined you? ○ Doctor ○ Staff nurse ○ Health Assistant ○ Auxilliary Nurse Midwife ○ AHW ○ MCHW ○ VHW ○ FCHV ○ Traditional Birth Attendants ○ Shaman (Dhami Jhangri) ○ Medicine shop ○ Village 'practitioner' ○ Other _____
M ७४. तपाईलाई सुत्केरीको अवस्थामा महिला स्वास्थ्य स्वयम सेबिकाले भेट्न आउनु भएको थियो ? ○ थियो ○ थिएन	M74	Did the FCHV come and see you after your delivery? ○ Yes ○ No
M ७५. तपाईले सुत्केरी अवस्थामा महिला स्वास्थ्य स्वयम सेबिकालाई आफैले भेट्न जानु	M75	Did you go and see the FCHV yourself after your delivery?

भएको थियो ? ○ थियो ○ थिएन		○ Yes ○ No
M ७६. सुत्केरी भई सकेपछि तपाईलाई भिटामिन ए क्यापसुल दिएको थियो ? ○ थियो ○ थिएन	M76	After delivery were you given a vitamin A capsule? ○ Yes ○ No
M ७६.१ यदि थियो भने कस्ले भिटामिन ए क्यापसुल दिएको थियो? □ डाक्टर □ स्टाफ नर्स □ हे.अ □ अ.न.मी □ अ.हे.व □ मा.शि.का □ ग्र.स्वा.का □ म.स्वा.स्वं सेविका □ सुडेनी □ औषधी पसले □ गाउंको प्राक्टिस्नर □ धामी झांक्री □ अन्य	M76.1	If yes who gave it to you? ○ Doctor ○ Staff nurse ○ Health Assistant ○ Auxilliary Nurse Midwife ○ AHW ○ MCHW ○ VHW ○ FCHV ○ Traditional Birth Attendant ○ Medicine shop keeper ○ Village 'practitioner' ○ Shaman (Dhami Jhangri) ○ Other _____
M ७७. सुत्केरी भई सकेपछि तपाईलाई आइरन चक्की दिइएको थियो ? ○ थियो ○ थिएन	M77	After delivery were you given iron pills? ○ Yes ○ No
M ७७.१ यदि थियो भने कोले आइरन चक्की दिइएको थियो? □ डाक्टर □ स्टाफ नर्स □ हे.अ □ अ.न.मी □ अ.हे.व □ मा.शि.का □ ग्र.स्वा.का □ म.स्वा.स्वं सेविका □ सुडेनी □ औषधी पसले □ गाउंको प्राक्टिस्नर □ धामी झांक्री □ अन्य	M77.1	If yes who gave them to you? □ Doctor □ Staff nurse □ Health Assistant □ Auxilliary Nurse Midwife □ AHW □ MCHW □ VHW □ FCHV □ Traditional Birth Attendant □ Medicine shop keeper □ Village 'practitioner' □ Shaman (Dhami Jhangri) □ Other _____
M ७८. सुत्केरी भई सकेपछि तपाईले एन्टीबायोटीक औषधी खानुभएको थियो ? ○ थियो ○ थिएन	M78	Did you take any antibiotic medicine after your delivery ○ Yes ○ No
M ७८.१ यदि थियो भने एन्टीबायोटीक औषधी काहं बाट पाउनु भयो ? □ डाक्टर □ स्टाफ नर्स □ हे.अ □ अ.न.मी □ अ.हे.व □ मा.शि.का □ ग्र.स्वा.का □ म.स्वा.स्वं सेविका □ सुडेनी □ औषधी पसले □ गाउंको प्राक्टिस्नर □ धामी झांक्री □ अन्य	M78.1	If yes where did you get the antibiotics from? □ Doctor □ Staff nurse □ Health Assistant □ Auxilliary Nurse Midwife □ AHW □ MCHW □ VHW □ FCHV □ Traditional Birth Attendant □ Medicine shop keeper □ Village 'practitioner' □ Shaman (Dhami Jhangri) □ Other _____

मिरा, धनुषा		MIRA DHANUSHA
GARIMA गरिमा प्रश्नावली : आमा समूह तथा सुत्केरी सहयोग मोड्युल		**GARIMA questionnaire: WOMEN'S GROUP & MATERNITY FINANCING MODULE**
तलका अवस्थामा यो मोड्युल प्रयोग गर्नहोला - आमा र बच्चा २८ दिन सम्म जिबीतै भएमा - बच्चाको मृत्यु २८ दिन सम्म भएको र आमा जिउँदै भएको - आमाको मृत्यु २८ दिन सम्म भएको र बच्चा जिउँदै भएको - आमा र बच्चा दुबैको मृत्यु २८ दिन सम्म भएको - २८ दिन पछी आमाको मृत्यु भएको (यदि गरिमा प्रश्नावली मृत्यु भन्दा अगाडी भरेको थिएन) - महीलाको मृत्यु भएको		*Use this module in the following situations:* - *Mother and baby alive at 28 days* - *Mother Alive but baby dead at 28 days* - *Baby alive but mother dead at 28 days* - *Both baby and mother dead at 28 days* - Mother dead after 28 days (if GARIMA not filled before the death) - *Female death*
मिराको कर्मचारीले तपाईलाई यो भन्दा अगाडी आमा समूह र सुत्केरी सहयोग को बरेमा सोध्नु भएको थियो ? ○ थियो ○ थिएन		Has a MIRA employee asked you about women's groups and the maternity financing scheme before? ○ Yes ○ No
यदि थियो भने कहा ? गा.वि.स. नं .... वडा नं. ..... टोल		If yes where? VDC No ___ ___ Ward no ___ Tole _____
यदि थियो भने कहिले ? साल .... महिना		If yes when? Year _____ Month _____
DATABASE IDENTIFICATION INFORMATION		**DATABASE IDENTIFICATION INFORMATION**
अन्तरवार्ता लिने व्यक्तिको आई डी नं.		INTERVIEWER ID. ___ ___
अन्तरवार्ता लिईएको मिति : .... गते .... महिना ..... साल		DATE OF INTERVIEW ___ ___ / ___ ___ / ___ ___ ___ ___
अवलोकन गरेको ☐		INTERVIEW OBSERVED ☐

युनीट अफीसमा चेक भएको ☐		CHECKED IN UNIT OFFICE ☐
अन्तरवार्ता भईसकेको धरमा गाएर चेक भएको ☐		CHECKED BY RE-VISITING HOUSE WHERE INTERVIEW TOOK PLACE ☐
घरमुलीको नाम		Name of household head _____
गा.वि.स. नं .... वडा नं. ..... टोल		VDC no _____ Ward no ____ Tole _____
घरधुरी. नं		Household number _____
MW को परिचय नं :		MW (married woman's) ID number _____
MW को नाम.....		MW (married woman's) name _____
MW को जन्म मिति : .... गते .... महिना ..... साल ***(यदि जन्म मिति थाहा छैन भने उमेर वर्षमा लेख्नुहोस्)*** MW को उमेर .... वर्ष		Date of birth of MW ___ ___ / ___ ___ / ___ ___ ___ ___ If you do not know the exact date of birth please give the Age of the MW ___ ___ years
BABY ID बच्चाको परिचय नं :		BABY ID number _____

अर्न्तवार्ताको लागी अनुमती लिएको ☐		PERMISSION GRANTED FOR THE INTERVIEW ☐
अर्न्तवार्ताको लागी अनुमती दिनेको सही अथवा औठाको छाप (त्याप्चे):		Signature or thumbprint of person granting permission _____
क. मुख्य उत्तरदाताको नाम :.....	a.	Name of main interviewee _____
ख. मुख्य उत्तरदाता संग MW को नाता	b.	Relationship to the married woman _____
ग. अन्य उत्तरदाताको नाम :	c.	Name of other interviewee _____
घ. अन्य उत्तरदाता संग MW को नाता	d.	Relationship of other interviewee to the married woman _____
ङ. अन्तर्वार्ताको समयमा को-को उपस्थित हुनुहुन्थ्यो ? ☐ MW ☐ सासु ☐ ससुरा ☐ श्रीमान् ☐ ससुराली घरको अन्य महिला ☐ आमा ☐ बुवा ☐ माइतीका अन्य महिला ☐ महिला छिमेकी ☐ महिला साथी ☐ पुरुष छिमेकी ☐ अन्य ।	e.	Who was present at the interview? ☐ MW married woman herself (to whom the interview refers) ☐ Mother-in-law ☐ Father-in-law ☐ Husband ☐ Other women from

		husband's household ⊐ Mother ⊐ Father ⊐ Other women from the parental household ⊐ Female neighbour ⊐ Female Friend ⊐ Male neighbour ⊐ Other
आमा समूह		**MOTHERS' GROUP**
WG १. तपाईले मिराको सहयोगमा संचालित आमा समूहको बारेमा कहिल्यै सुन्नु भएको थियो ? ○ थियो ○ थिएन	WG1	Have you heard of mother's groups operated with MIRA's assistance? ○ Yes ○ No
(यदि थिएन भने प्रश्न नं. १२९ मा जानुहोस्)		***If no go to question WG2***
WG १.१ यदि सुन्नुभएको थियो भने कहाँ सुन्नु भएको थियो ? ○ महिला स्वास्थ्य स्वयम सेबिका बाट ○ आमा समूहको सहयोगी सहजकर्ता बाट ○ आमा समूहको सदस्य बाट ○ गाउले बाट ○ मिराको कर्मचारी बाट ○ स्वास्थ्य संस्था बाट ○ अन्य	WG1.1	If you have heard of mother's groups operated with MIRA's assistance, where did you hear about them? ○ From FCHV ○ From Mother's group cofacilitator ○ From Mother's group member ○ From villager ○ From MIRA staff ○ From health facility ○ Other _____
WG १.२ यदि सुन्नुभएको थियो भने तपाईलाई त्यसको बारेमा के थाहा छ ?	WG1.2	If you have heard of mother's groups operated with MIRA's assistance, what have you heard? _____
WG २. तपाईले मिराको सहयोगमा संचालित आमा समुहको बैठकमा भाग लिनु भएको छ ? ○ छ ○ छैन	WG2	Have you been to any women's groups operated with MIRA's assistance? ○ Yes ○ No
(यदि छैन भने प्रश्न नं. WG ३ मा जानुहोस्)		***If no go to question WG3***
WG २.१ यदि छ भने बैठक कस्ले चलाउछ ? ○ महिला स्वास्थ्य स्वयम सेबिका ○ आमा समूहको सहयोगी सहजकर्ता ○ आमा समूहको सदस्य ○ अन्य	WG2.1	If yes who ran the group? ○ FCHV ○ Mother's group cofacilitator ○ Mother's group member ○ Other _____
WG २.२ यदि छ भने कति पटक भाग लिनु भएको छ ? ○ १ देखि ५ पटक ○ ६ देखि १० पटक ○ ११ देखि १५ पटक ○ १६ देखि माथि	WG2.2	If yes how many times did you attend? ○ 1-5 times ○ 6 to 10 times ○ 11 to 15 times ○ More than 16 times
WG २.३ सबैभन्दा पछिल्लो पटक तपाईले समूह बैठकमा कहिले भाग लिनु भएको थियो ? ○ गएको महिना ○ दुई तीन महिना अघि ○ छ महिना अघि ○ एक वर्ष अघि ○ एक वर्ष भन्दा बढि	WG2.3	When did you first take part in the women's group? ○ last month ○ 2-3 months ago ○ 6 months ago ○ one year ago ○ more than one year ago

WG ३. तपाईले कहिलै मिराको मातृ शिशुको चित्र खेल खेल्नु भएको छ ? ○ छ ○ छैन	WG3	Have you ever played the MIRA maternal child health picture card game? ○ Yes ○ No
(यदि छैन भने प्रश्न नं. WG ४ मा जानुहोस्)		***If no go to question WG4***
WG ३.१ यदि छ भने को सँग खेल्नु भएको छ ? ○ महिला स्वास्थ्य स्वयम सेविका ○ आमा समूहको सहयोगी सहजकर्ता ○ आमा समूहको सदस्य ○ अन्य	WG3.1	If yes who did you play the game with? ○ FCHV ○ Mother's group cofacilitator ○ Mother's group member ○ Other _____
WG ४. तपाई सेविकाले चलाउने समूह बाहेक अन्य कुनै सँघ संस्थाको सहयोगमा चलेको समूह बैठकमा जाने गर्नुभएको छ ? ○ छ ○ छैन	WG4	Other than the FCHV-run mother's group, have you attended any other organisation's group? ○ Yes ○ No
(यदि छैन भने प्रश्न नं. WG ५ मा जानुहोस्)		***If no go to question WG5***
WG ४.१ यदि छ भने कुन समूहको बैठकमा जाने गर्नुभएको छ ? उल्लेख गर्नुहोस्	WG4.1	If yes which group's meetings have you attended? Please write _____
सुत्केरी सुविधा		**MATERNITY FINANCING SCHEME QUESTIONS**
WG ५. तपाई सुत्केरी हुनु भन्दा अगाडी तपाईले सरकारले दिएको सुत्केरी सुविधाको बारेमा सुन्नु भएको थियो ? जसमा स्वास्थ्य संस्था मा बच्चा जन्माउने महिलाहरुलाई पैसा पाउन्छ ? ○ थियो ○ थिएन	WG5	Before you delivered, had you heard of the government financing scheme in which women are given money for delivering their baby in a health facility? ○ Yes ○ No
(यदि छैन भने वा तपाईले बच्चा घरमा जन्माउनु भयो भने आमा समूह तथा सरकार बाट सुत्केरी सहयोग मोड्युल को अन्तिम मा जानुहोस्)		***If no or if you delivered your baby at home go to end of GARIMA women's group and government financing scheme module***
WG ६. बच्चा स्वास्थ्य संस्था मा जन्माइसके पछी तपाईले पैसा पाउनु भयो ? ○ भयो ○ भएन	WG6.	When you went to the health facility did you get any money? ○ Yes ○ No
WG ७. यदि भएन भने पछी दिन्छु भन्नु भएको छ? ○ छ ○ छैन	WG7.	If no, did they tell you that you would receive money at a later date? ○ Yes ○ No
WG ८. यदि छ भने कती रुपैया दिने भन्नु भएको छ? रु ..... ○ थाहा छैन	WG8.	If yes, how much did they say you would receive? Rs_____ ○ Don't know
(यदि भएन भने आमा समूह तथा सरकार बाट सुत्केरी सहयोग मोड्युल को अन्तिम मा जानुहोस्)		***If no go to end go to end of GARIMA women's group and government***

		financing scheme module
WG ९. यदि पैसा पाउनु भयो भने कति पाउनु भयो ? रु	WG9.	If you got any money how much did you get? Rs _____
WG १०. कस्ले पैसा दिएको ? ○ डाक्टर ○ स्टाफ नर्स ○ हे.अ ○ अ.न.मी ○ अ.हे.व ○ मा.शि.का ○ ग्र.स्वा.का ○ अन्य	WG10	Who gave it to you? ○ Doctor ○ Staff nurse ○ Health Assistant ○ Auxilliary Nurse Midwife ○ AHW ○ MCHW ○ VHW ○ Other _____
यदि बच्चा जिबीत छ भने गरिमा नवजात शिशु स्याहार मोड्युल तथा संक्रमण व्यबस्थापन मोड्युल मा जानुहोस		**If the baby is alive go to GARIMA newborn care module and sepsis management module.**
यदि बच्चा जिबीत छैन भने अर्न्तवार्ता रोक्नुहोस र verbal autopsy भर्नुहोस ***(अन्तरवाता बन्दा गर्नको लागी धन्यबाद र नमस्कार भन्नुहोस ।)***		**If the baby is not alive stop the interview and fill in a verbal autopsy form. (Close the interview by thanking the respondent and saying namaskar)**

मिरा, धनुषा		MIRA DHANUSHA
GARIMA गरिमा प्रश्नावली : नवजात शिशु स्याहार मोड्युल		**GARIMA questionnaire: NEWBORN CARE MODULE**
तलका अवस्थामा यो मोड्युल प्रयोग गर्नहोला - आमा र बच्चा २८ दिन सम्म जिबीतै भएमा - बच्चा जिउँदै तर आमा मृत्यु २८ दिन सम्म भएमा		*Use this module in the following situations:* - *Mother and baby alive at 28 days* - *Baby alive but mother dead at 28 days*
मिराको कर्मचारीले तपाईलाई यो भन्दा अगाडी नवजात शिशु स्याहारको बरेमा सोध्नु भएको थियो ? ◯ थियो ◯ थिएन		Has a MIRA employee asked you about the newborn care before? ◯ Yes ◯ No
यदि थियो भने कहा ? गा.वि.स. नं .... वडा नं. ..... टोल		If yes where? VDC No ___ ___ Ward no ___ Tole _____
यदि थियो भने कहिले ? साल .... महिना		If yes when? Year ___ ___ Month ___ ___
DATABASE IDENTIFICATION INFORMATION		**DATABASE IDENTIFICATION INFORMATION**
अन्तरवार्ता लिने व्यक्तिको आई डी नं.		INTERVIEWER ID. ___ ___
अन्तरवार्ता लिईएको मिति : .... गते .... महिना ..... साल		DATE OF INTERVIEW ___ ___ / ___ ___ / ___ ___ ___ ___
अवलोकन गरेको ☐		INTERVIEW OBSERVED ☐
युनीट अफीसमा चेक भएको ☐		CHECKED IN UNIT OFFICE ☐
अन्तरवार्ता भईसकेको धरमा गाएर चेक भएको ☐		CHECKED BY RE-VISITING HOUSE WHERE INTERVIEW TOOK PLACE ☐
घरमुलीको नाम		Name of household head _____
गा.वि.स. नं .... वडा नं. ..... टोल		VDC no ___ ___ Ward no ___ Tole _____
घरधुरी. नं		Household number ___ ___ ___ ___
MW को परिचय नं :		MW (married woman's) ID number ___ ___ ___ ___ ___ ___ ___ ___

MW को नाम.....		MW (married woman's) name _____
BABY ID बच्चाको परिचय नं :		BABY ID number _____ ___ ___

अर्न्तवार्ताको लागी अनुमती लिएको ☐		PERMISSION GRANTED FOR THE INTERVIEW ☐
अर्न्तवार्ताको लागी अनुमती दिनेको सही अथवा औठाको छाप (त्याप्चे):		Signature or thumbprint of person granting permission _____
क. मुख्य उत्तरदाताको नाम :.....	a.	Name of main interviewee _____
ख. मुख्य उत्तरदाता संग MW को नाता	b.	Relationship to the married woman _____
ग. अन्य उत्तरदाताको नाम :	c.	Name of other interviewee _____
घ. अन्य उत्तरदाता संग MW को नाता	d.	Relationship of other interviewee to the married woman _____
ङ. अन्तर्वार्ताको समयमा को-को उपस्थित हुनुहुन्थ्यो ? ☐ MW ☐ सासु ☐ ससुरा ☐ श्रीमान् ☐ ससुराली घरको अन्य महिला ☐ आमा ☐ बुवा ☐ माइतीका अन्य महिला ☐ महिला छिमेकी ☐ महिला साथी ☐ पुरुष छिमेकी ☐ अन्य ।	e.	Who was present at the interview? ☐ MW married woman herself (to whom the interview refers) ☐ Mother-in-law ☐ Father-in-law ☐ Husband ☐ Other women from husband's household ☐ Mother ☐ Father ☐ Other women from the parental household ☐ Female neighbour ☐ Female Friend ☐ Male neighbour ☐ Other
नवजात शिशु		**NEWBORN BABY**
N १. शिशुको नाम	N1	Name of newborn baby _____
N २. बच्चाको तौल . किलो ○ तौल लिएको तर तौल थाहा छैन ○ तौल लिएको छैन	N2	Weight of baby? ___ ___ . ___ Kg ○ Weight was taken but don't know it ○ Weight was not taken
N ३. बच्चाको जन्म मिति .... गत .... महिना ....साल	N3	Baby's date of birth ___ ___ day ___ ___ month ___ ___ year
N ४. बच्चाको लिङ्ग के हो ? ○ छोरा ○ छोरी	N4	Sex of the baby: ○ Boy ○ Girl
N ५. कति महिनाको गर्भ पुरा हँदा बच्चा जन्मियो ? .... महिना	N5	After how many months gestation was the baby born? ___ ___ months

N ६. यो बच्चा जुम्ल्याहा वा तिम्ल्याहा हो? ○ एउटै बच्चा ○ जुम्ल्याहा ○ तिम्ल्याहा	N6	Was it twins or triplets? ○ Singleton ○ Twins ○ Triplet
(होइन भने प्रश्न नं N ८ मा जानुहोस)		*If no go to question N8*
(यदि जुम्ल्याहा वा तिम्ल्याहा बच्चा हो भने हरेक बच्चाको लागी छुट्टाछुट्टै गरिमा भाग २ भर्नुहोस)		***If twins or triplets, fill in a separate part 2 of the GARIMA form for each baby***
N ७. यो बच्चा पहिलो वा दोस्रो वा तेस्रो कुन हो ? ○ पहिलो ○ दोस्रो ○ तेस्रो	N7	If yes is this baby the first, second or third? ○ First ○ Second ○ Third
नवजात शिशु स्याहार		NEWBORN BABY CARE
N ८. बच्चा कसरी जन्मीएको थियो ? ○ आफै ○ अरुको सहयोगले ○ औजार प्रयोग गरेर ○ अपरेशन गरेर	N8	How was the baby born? ○ By itself ○ With help from someone ○ Using forceps / instruments ○ By operation (C-section)
(यदि अस्पताल वा प्रा.स्वा.के मा बच्चा जन्मीएको भए प्रश्न नं N ११ मा जानुहोस)		*If born in hospital or PHC go to question number 11*
N ९. बच्चाको कुन चाँहि अङ्ग सबैभन्दा पहिले बाहिर आएको थियो ? ○ टाउको ○ चाक ○ हातखुट्टा ○ नाल ○ थाहा छैन	N9	Which part of the baby appeared first? ○ Head ○ Buttocks ○ Limb ○ Umbilical cord ○ Don't know
N १०. सुत्केरी कोठालाई आगो/स्टोभ अथवा अन्य तातो साधनले कहिले तताएको थियो ? ○ वच्चा जन्मनु भन्दा अगाडी ○ वच्चा जन्मी सकेपछि ○ वच्चा जन्मीनु भन्दा अगाडी र जन्मी सके पछि ○ थिएन ○ थाहा छैन	N10	Was the delivery room heated by a fire or stove or any other means at any time? ○ Before the birth ○ After the birth ○ Both before and after the birth ○ Not heated ○ Don't know
N ११. सुत्केरी हुँदा कस्ले सहयोग गरेको थियो ? ☐ डाक्टर ☐ स्टाफ नर्स ☐ हे.अ ☐ अ.न.मी ☐ सि.अ.हे.व/अ.हे.व/सि.एम.ए ☐ मा.शि.का ☐ ग्र.स्वा.का ☐ म.स्वा.स्व सेविका ☐ सुडेनी ☐ सासु ☐ अन्य परिवारका सदस्य ☐ छिमेकी / साथी ☐ औषधी पसले ☐ गाउंको प्राक्टिस्नर ☐ धामी झांकी ☐ आफै (कोहि नभएको) ☐ अन्य	N11	Who assisted at the delivery? ⌟ Doctor ⌟ Staff nurse ⌟ Health Assistant ⌟ Auxilliary Nurse Midwife ⌟ SAHW / AHW / CMA ⌟ MCHW ⌟ VHW ⌟ FCHV ⌟ Traditional Birth Attendants ⌟ Mother-in-law ⌟ Other family member ⌟ Neighbour / friend ⌟ Medicine shop keeper ⌟ Village 'practitioner' ⌟ Shaman (Dhami Jhangri) ⌟ Self (no assistant) ⌟ Other _____
(आफै सुत्केरी भएको भए प्रश्न नं N १३ मा जानुहोस)		*If mother delivered the baby herself go to question N13*
N १२. सहयोग गर्ने मानिसले हात धोएको थियो ? ○ थियो ○ थिएन ○ थाहा छैन	N12	Did the assistant wash their hands? ○ Yes ○ No ○ Don't know
N १३. सुत्केरी सामाग्री प्रयोग गर्नु भयो ? ○ भयो ○ भएन	N13	Did you use a safe delivery kit ? ○ Yes ○ No

(भएन भने प्रश्न नं N १५ मा जानुहोस ।)		*If no go to question N15*
N १४. यदि प्रयोग गर्नु भएको भए काहाबाट ल्याउनु भयो ? ○ पसल ○ म.स्वा.स्व सेविका ○ सुडेनी ○ आमा समूह ○ स्वास्थ्य संस्था ○ थाहा छैन ○ अन्य	N14	If you used a safe delivery kit where did you get it from? ○ Shop ○ FCHV ○ TBA ○ Mother's group ○ Health facility ○ Don't know ○ Other _____
N १५. नाल के ले काट्नु भयो ? ○ उमालेको पत्ती ○ नउमालेको पत्ती ○ चक्कु/छुरी/कैची ○ हसीया/खुर्पा ○ वाँसले ○ थाहा छैन ○ अन्य	N15	What did you use to cut the cord? ○ Boiled blade ○ Unboiled blade ○ Knife / Scissors ○ Sickle or sharpened trowel ('khurpi') ○ Bamboo ○ Don't know ○ Other ____
N १६. नाल बाध्नु भएको थियो ? ○ थियो ○ थिएन	N16	Did you tie the cord? ○ Yes ○ No
N १७. नाभी काटीसकेपछि के लगाउनु भयो ? ⌴ तेल ⌴ वेसार ⌴ औषधी, डिटोल ⌴ पाउडर ⌴ माटो ⌴ खरानी ⌴ केही नराखेको ⌴ थाहा छैन ⌴ अन्य	N17	What did you apply after cutting the cord? ⌟ Oil ⌟ Turneric ⌟ Medicine / Dettol ⌟ Powder ⌟ Soil / clay ⌟ Ash ⌟ Nothing ⌟ Don't know ⌟ Other _____
N १८. जन्मीएको कति समय पछि बच्चालाई नुहाईदिनु भएको थियो ? ○ एक घण्टा भित्र ○ एक घण्टा देखी २४ घण्टा भित्र ○ २४ घण्टा भन्दा पछि	N18	How long after the birth did you bathe the baby? ○ Within one hour ○ Between 1 and 24 hours ○ After 24 hours
N १९. बच्चा जन्मीएको कति वेर पछि बच्चालाई कपडाले वेरिएको थियो ? ○ तुरुन्तै ○ आधा घण्टा भित्र ○ आधा घण्टा भन्द पछी	N19	How long after the birth did you wrap the baby in cloth? ○ Immediately ○ Within half an hour ○ After half an hour
N २०. तपाईको बच्चालाई बि.सि.जि. खोप दिनु भयो ? ○ दिए ○ दिईन ○ थाहा छैन	N20	Did you give the baby a BCG injection? ○ Yes ○ No ○ Don't know
आमाको दुध /बच्चाको खाना		**MOTHER'S MILK / INFANT FEEDING**
N २१. बच्चालाई पहिलो पटक के खान दिईयो ? ○ आमाको दुध ○ अरु आमाको दुध ○ गाई/भैसीको दुध ○ बाखाको दुध ○ ल्याक्टोजिन ○ चिया वा जडिबुटी पानी ○ घ्यू/घ्यू चिनी/घ्यू मह ○ तेल ○ पानी ○ चिनी/मह/मिठा/ग्लुकोज भएको पानी ○ मह ○ भातको माड/ लिटो /जौलो /सेरेलेक्स ○ फलफूलको रस ○ जिवन झोल	N21	What did you feed the baby first of all? ○ Mother's milk ○ Another mother's milk ○ Cow of buffalo milk ○ Goats milk ○ Formula milk / Lactogen ○ Tea or herbal water ○ Ghee / Ghee & sugar / Ghee & honey ○ Oil ○ Water ○ Sugar / honey / raw sugar / glucose water ○ Honey ○ Rice starch / litho (improved flour

○ औषधि वा भिटामिन झोल ○ अन्य झोल पढार्थ ○ अन्य ..... ○ थाहा छैन		paste) / rice porridge / cerelec ○ Fruit juice ○ Rehydration fluids ○ Medicine or vitamin syrup ○ Other fluids ○ Other _____ ○ Don't know
N २२. तपाईले आफ्नो बच्चालाई आफ्नो दुध खुवाउनु भयो ? ○ भयो ○ भएन	N22	Have you breastfed the baby? ○ Yes ○ No
(भएन भने प्रश्न नं N २५ मा जानुहोस)		***If no go to question N25***
N २३. बच्चा जन्मीएको कति वेर पछि आफ्नो दुध चुसाउनु भयो ? ○ एक घण्टा भित्र ○ ६ घण्टा भित्र ○ २४ घण्टा भित्र ○ २ दिन भित्र ○ ३ दिन भित्र ○ ४ दिन भित्र ○ ४ दिन पछी	N23	How long after the birth did you first feed you baby your milk? ○ Within one hour ○ Within 6 hours ○ 6 to 24 hours ○ Within 2 days ○ Within 3 days ○ Within 4 days ○ After 4 days
N २४. बच्चालाई पहिलो पटक दुध खुवाउनु भन्दा अगाडी बिगौती दुध निचोरेर फाल्नु भयो ? ○ भयो ○ भएन	N24	Did you discard colostrum before feeding the baby first? ○ Yes ○ No
N २५. गएको २४ घण्टामा तलको मध्ये तपाइको वच्चालाइ के के खुवाउनु भएको थियो ? ☐ आमाको दुध ☐ अरु आमाको दुध ☐ गाई/भैसीको दुध ☐ बाखाको दुध ☐ ल्याक्टोजिन ☐ चिया वा जडिबुटी पानी ☐ घ्यू/घ्यू चिनी/घ्यू मह ☐ तेल ☐ पानी ☐ चिनी/मह/गुँड/मिठा भएको पानी ☐ चिनी/मह/गुँड/मिठा ☐ भातको माड/ लिटो /जाउलो/सेरेलेक्स ☐ फलफूलको रस ☐ जिवन झल ☐ औषधि वा भिटामिन झोल ☐ अन्य झोल पढार्थ ☐ अन्य ..... ☐ थाहा छैन	N25	What did you feed the baby in the last 24 hours? ⌟ Mother's milk ⌟ Another mother's milk ⌟ Cow of buffalo milk ⌟ Goats milk ⌟ Formula milk / Lactogen ⌟ Tea or herbal water ⌟ Ghee / Ghee & sugar / Ghee & honey ⌟ Oil ⌟ Water ⌟ Sugar / honey / raw sugar / glucose in water ⌟ Sugar / honey / raw sugar alone ⌟ Rice starch / litho improved flour paste / rice porridge / cerelec ⌟ Fruit juice ⌟ Rehydration fluids ⌟ Medicine or vitamin syrup ⌟ Other fluids ⌟ Other _____ ⌟ Don't know
N २६. गएको ७ दिनमा तलको मध्ये तपाइको वच्चालाइ के के खुवाउनु भएको थियो ? ☐ आमाको दुध ☐ अरु आमाको दुध ☐ गाई/भैसीको दुध ☐ बाखाको दुध ☐ ल्याक्टोजिन ☐ चिया वा जडिबुटी पानी ☐ घ्यू/घ्यू चिनी/घ्यू मह ☐ तेल ☐ पानी ☐ चिनी/मह/गुँड/मिठा भएको पानी ☐ चिनी/मह/गुँड/मिठा ☐ भातको माड/ लिटो / जाउला/सेरेलेक्स ☐ फलफूलको रस ☐ जिवन झल ☐ औषधि वा भिटामिन झोल ☐ अन्य झोल पढार्थ ☐ अन्य ..... ☐ थाहा छैन	N26	What did you feed the baby in the last 7 days? ⌟ Mother's milk ⌟ Another mother's milk ⌟ Cow of buffalo milk ⌟ Goats milk ⌟ Formula milk / Lactogen ⌟ Tea or herbal water ⌟ Ghee / Ghee & sugar / Ghee & honey ⌟ Oil ⌟ Water ⌟ Sugar / honey / raw sugar / glucose in water ⌟ Sugar / honey / raw sugar alone ⌟ Rice starch / litho improved flour paste / rice porridge / cerelec ⌟ Fruit juice ⌟ Rehydration fluids ⌟ Medicine or vitamin syrup

		⌟ Other fluids ⌟ Other _____ ⌟ Don't know
वच्चाको स्वास्थ्य स्याहार		**BABY'S HEALTH CARE**
N २७. के वच्चा जन्मने वित्तिकै रोयो ? ○ रोयो ○ रोएन	N27	Did the baby cry at birth? ○ Yes ○ No
(यदि रोयो भने प्रश्न नं. N २९ मा जानुहोस् ।)		***If yes go to question 29***
N २८. यदि रोएन भने वच्चा जन्मेको कति समय पछि पहिलो पटक रोयो ? ○ ५ मिनेट भित्र ○ ५ देखि ३० मिनेट विचमा ○ ३० मिनेट पछादी ○ कहिल्यै रोएन	N28	If no, how long after birth did the baby first cry? ○ within 5 min ○ 5-30 min ○ more than 30 min ○ never
N २९. के वच्चा जन्मेको बेलामा निदाउरो वा लल्याकलुलुक थियो ? ○ थियो ○ थिएन	N29	Was the baby sleepy and floppy at the time of birth? ○ Yes ○ No
(यदि थिएन भने प्रश्न नं. N ३१ मा जानुहोस् ।)		***If no go to question 31***
N ३०. यदि थियो भने निदाउरो वा लल्याकलुलुक भएको समस्या कति समय सम्म लगातार रहि रह्यो ? ○ ३० मिनेट भन्दा कम ○ ३० मिनेट देखि १ दिन विचमा ○ १ दिन भन्दा बडी	N30	If yes, for how long was the baby sleepy and floppy? ○ less than half an hour ○ more than half an hour and less than a day ○ more than a day
N ३१. वच्चा जन्मेको दिन देखी बच्चालाई दुध चस्न गाह्रो भएको थियो ? ○ थियो ○ थिएन	N31	Did the baby have problems feeding from the first day of birth? ○ Yes ○ No
(यदि थिएन भने प्रश्न नं. N ३३ मा जानुहोस् ।)		***If no go to question 33***
N ३२. यदि चस्न गाह्रो भएको थियो भने कति समय सम्म समस्या लगातार रहि रह्यो ? घण्टा ..... दिन	N32	If yes for how long did the feeding problem go on for continuously? Hours ___ ___ days ___ ___
N ३३. जन्मेको पहिलो दिनहरुमा वच्चालाई कम्पन आएको थियो ? ○ थियो ○ थिएन	N33	Did the baby have any fits in the first few days of life? ○ Yes ○ No
N ३४. बच्चालाई खोकी लागेको थियो ? ○ थियो ○ थिएन	N34	Has the baby had a cough? ○ Yes ○ No
(यदि थिएन भने प्रश्न नं. N ३६ मा जानुहोस् ।)		***If no go to question N36***
N ३५. कति दिन सम्म लगातार खोकी लाग्यो ? .... दिन	N35	How many days continuously has the baby had a cough? ___ ___ days
N ३६. बच्चाले छिटो छिटो सास फेरेको थियो ? ○ थियो ○ थिएन	N36	Did the baby have fast breathing? ○ Yes ○ No
N ३७. बच्चाको कोखा हानेको देख्नु भएको थियो ? ○ थियो ○ थिएन	N37	Did you see the baby's chest indrawing / could you see the chest moving?

		○ Yes ○ No
N ३८. बच्चालाई दुध खान गाह्रो परेको थियो ? ○ थियो ○ थिएन	N38	Did the baby have difficulties breastfeeding? ○ Yes ○ No
N ३९ बच्चालाई पखाला लागेको थियो ? ○ थियो ○ थिएन	N39	Did the baby have diarrhoea? ○ Yes ○ No
(यदि थिएन भने प्रश्न नं. N ४१ मा जानुहोस् ।)		***If no go to question N41***
N ४०. कति दिन सम्म पखाला लागेको थियो ? .... दिन	N40	How many days did the baby have diarrhoea? ____ ____ days
N ४१. बच्चाले बारम्बार बान्ता गरेको थियो ? ○ थियो ○ थिएन	N41	Did the baby vomit continuously? ○ Yes ○ No
N ४२. बच्चालाई बढि ज्वरो आएको थियो ? ○ थियो ○ थिएन	N42	Did the baby have a high fever? ○ Yes ○ No
(यदि थिएन भने प्रश्न नं. N ४४ मा जानुहोस् ।)		***If no go to question N44***
N ४३. कति दिन सम्म ज्वरो आएको थियो ? .... दिन	N43	How many days did the baby have fever? ____ ____ days
N ४४. बच्चको नाइटो पाक्ने समस्या थियो ? ○ थियो ○ थिएन	N44	Did the baby have an umbilical infection? ○ Yes ○ No
N ४५. बच्चालाई पहेलो रोग (जन्डीस) भएको थियो ? ○ थियो ○ थिएन	N45	Did the baby have jaundice / was it yellow? ○ Yes ○ No
N ४६. बच्चालाई अन्य समस्या पनि थियो जसले तपाईलाई चिन्तीत तुल्यायो ? ○ थियो ○ थिएन	N46	Did the baby have any other problems that worried you? ○ Yes ○ No
(यदि थिएन भने प्रश्न नं. N ४७ मा जानुहोस् ।)		***If no go to question N47***
N ४६.१ यदि थियो भने के थियो ?	N46.1	If yes what problems were they? _____
N ४७. बच्चा बिरामी हुँदा उपचार गराउनु भयो ? ○ भयो ○ भएन	N47	When the baby was ill did you get treatment for it? ○ Yes ○ No
(यदि गराउनु भएन भने प्रश्न नं. N ४९ मा जानुहोस् ।)		***If no go to question N49***
N ४८. बच्चा बिरामी भएको समयमा तपाई वा तपाईको परिवारको सदस्यले कसैसँग सम्पर्क नगरी आफै बच्चाको उपचार गराउनु भएको थियो ? ○ थियो ○ थिएन	N48	When the baby got ill did you or anyone from your family treat the baby at home without consulting anyone else? ○ Yes ○ No
N ४८.१ गराउनु भयो भने कस्तो उपचार गर्नु भयो ?	N48.1	If yes what treatment did you give? _____

.....		
(यदि उपचार गराउन्दा कसैसँग सम्पर्क गर्नु भयो भने प्रश्न नं. N ५० मा जानुहोस्)		***If you got treatment from someone go to question N50***
N ४९. यदि उपचार गराउनु भएन भने किन गराउनु भएन ?	N49	If you didn't seek treatment why not? _____
(यदि कुनै उपचार गराउनु भएन भने प्रश्न नं. N ७० मा जानुहोस्)		***If you didn't get treatment from anyone go to question N70***
N ५०. बच्चा बिरामी भए पछि सबैभन्दा पहिले कसलाई भेट्नु भयो ? ○ डाक्टर ○ स्टाफ नर्स ○ हे.अ ○ अ.न.मी ○ अ.हे.व ○ मा.शि.का ○ ग्र.स्वा.का ○ म.स्वा.स्व सेविका ○ सुडेनी ○ धामी झांकी ○ औषधी पसले ○ गाउंको प्राक्टिस्नर ○ अन्य.....	N50	When the baby got ill who did you consult first of all? ○ Doctor ○ Staff nurse ○ Health Assistant ○ Auxilliary Nurse Midwife ○ AHW ○ MCHW ○ VHW ○ FCHV ○ Traditional Birth Attendant ○ Shaman (Dhami Jhangri) ○ Medicine shop ○ Village 'practitioner' ○ Other _____
N ५१. विरमी भएको कति समय पछि तपाईले पहिलो पटक उपचार गराउनु पर्छ भन्ने निर्णय गर्नु भयो ? .... घण्टा वा .... दिन पछि ○ थाहा छैन	N51	How long after the baby became ill did you decide to seek care? _____ _____Hours _____ _____Days ○ Don't know
N ५२. पहिलो पटक उपचार गराउन कहाँ जानुभयो ? (ठाउं उल्लेख गर्नुहोस) ○ जनकपुर अचंल अस्पताल ○ अन्य अस्पताल ..... ○ प्रा.स्वा.के. ..... ○ स्वास्थ्य चौकी ..... ○ उप स्वास्थ्य चौकी ..... ○ गाउँ घर क्लिनिक ..... ○ मेडिकल कलेज ..... ○ परिवार नियोजन संघ ..... ○ निजी क्लिनिक/नर्सिङ्ग होम ..... ○ आर्युवेदीक अस्पताल ..... ○ औषधी पसल ..... ○ भारतको अस्पताल वा क्लिनिक ..... ○ शिविर ..... ○ धामी झांकीको घर ..... ○ अन्य ..... ○ स्वास्थ्य कार्यकर्तालाई घरमा वोलाएर	N52	Where did you go first for treatment? (write name of place) ○ Janakpur zonal hospital ○ Other hospital _____ ○ Primary Health Care Centre _____ ○ Health Post _____ ○ Sub Health Post _____ ○ Mobile Village Clinic _____ ○ Medical college _____ ○ Family Planning Association _____ ○ Private clinic / nursing home _____ ○ Ayurvedic hospital _____ ○ Medicine shop _____ ○ Indian hospital or clinic _____ ○ Health camp _____ ○ Shaman's (Dhami jhangri's) house ____ ○ Other _____○ Called health worker to the house

(यदि घरमा नै बोलाएको भए प्रश्न नं. N ५९ मा जानुहोस)		*If you called someone to your house go to question N59*
N ५३. त्यहाँ पुग्नको लागी तपाईले कुन साधान बढी प्रयोग गर्नु भयो ? ○ हिडेर ○ बोकेर ○ एम्बुलेन्स ○ कार/टेम्पो/बस/ट्रयाक्टर ○ रिक्सा ○ साइकल ○ मोटरसाइकल ○ स्ट्रेचर ○ रेल ○ बयल/टायर गाडा/टाँगा ○ साइकल एम्बुलेन्स	N53	Which form of transport did you use the most to get there? ○ Walking ○ Carried ○ Ambulance ○ Car / tempo / Bus / tractor ○ Rickshaw ○ Cycle ○ Motorcycle ○ Stretcher ○ Rail ○ Ox cart or horse trap ○ Cycle ambulance
N ५४. माथीको साधान बाहेक अन्य कुन कुन साधान प्रयोग गर्नु भयो ? ⌴ हिडेर ⌴ बोकेर ⌴ एम्बुलेन्स ⌴ कार/टेम्पो/बस/ट्रयाक्टर ⌴ रिक्सा ⌴ साइकल ⌴ मोटरसाइकल ⌴ स्ट्रेचर ⌴ रेल ⌴ बयल/टायर गाडा/टाँगा ⌴ साइकल एम्बुलेन्स	N54	Aside from the form of transport above what other means of transport did you use to get there? ⌴ Walking ⌴ Carried ⌴ Ambulance ⌴ Car / tempo / Bus / tractor ⌴ Rickshaw ⌴ Cycle ⌴ Motorcycle ⌴ Stretcher ⌴ Rail ⌴ Ox cart or horse trap ⌴ Cycle ambulance
N ५५. बिरमी भएको कति समय पछि त्यहाँ पुग्नभयो ? .... घण्टा वा .... दिन पछि ○ थाहा छैन	N55	How long after becoming ill did you get there? _____ hours _____ days ○ Don't know
N ५६. उनीहरुले बच्चालाई उपचार गरेको थियो ? ○ थियो ○ थिएन	N56	Did they treat the baby? ○ Yes ○ No
(यदि थिएन भने प्रश्न नं. N ५९ मा जानुहोस)		*If no go to question N59*
N ५७. कस्तो उपचार गर्नु भयो ?	N57	What treatment did they give? _____
N ५८. त्यहाँ पुगेको कति समय पछि उपचार पाउनु भयो ? .... घण्टा वा .... दिन पछि ○ थाहा छैन	N58	How long after getting there did you get treatment? _____ minutes _____ hours ○ Don't know
N ५९. त्यस पछि अरु संग पनि सम्पर्क गर्नु भयो ? ○ भयो ○ भएन	N59	After this did you go somewhere else for treatment? ○ Yes ○ No
(यदि भएन भने प्रश्न नं. N ७० मा जानुहोस)		*If no go to question N70*
N ६०. बिरमी भएको कति समय पछि तपाईले दोस्रो पटक उपचार गराउनु पर्छ भन्ने निर्णय गर्नु भयो ? .... घण्टा वा .... दिन पछि ○ थाहा छैन	N60	How long after the baby became ill did you decide to seek care from a second place? _____ Hours _____ Days ○ Don't know
N ६१. को संग सम्पर्क गर्नु भयो ? ○ डाक्टर ○ स्टाफ नर्स ○ हे.अ ○ अ.न.मी ○ अ.हे.व ○ मा.शि.का ○ ग्र.स्वा.का ○ म.स्वा.स्वं सेविका ○ सुडेनी ○ धामी झांकी	N61	When the baby got ill who did you consult second? ○ Doctor ○ Staff nurse ○ Health Assistant ○ Auxilliary Nurse Midwife ○ AHW ○ MCHW ○ VHW ○ FCHV ○

○ औषधी पसले ○ गाउंको प्राक्टिस्नर ○ अन्य.....		Traditional Birth Attendant ○ Shaman (Dhami Jhangri) ○ Medicine shop ○ Village 'practitioner' ○ Other _____
N ६२. उपचार गराउन कहाँ जानु भयो ? (ठाउं उल्लेख गर्नुहोस) ○ जनकपुर अचल अस्पताल ○ अन्य अस्पताल ..... ○ प्रा.स्वा.के. ..... ○ स्वास्थ्य चौकी ..... ○ उप स्वास्थ्य चौकी ..... ○ गाउँ घर क्लिनिक ..... ○ मेडिकल कलेज ..... ○ परिवार नियोजन संघ ..... ○ निजी क्लिनिक/नर्सिङ्ग होम ..... ○ आर्युवेदीक अस्पताल ..... ○ औषधी पसल ..... ○ भारतको अस्पताल वा क्लिनिक ..... ○ शिविर ..... ○ धामी झांक्रीको घर ..... ○ अन्य ..... ○ स्वास्थ्य कार्यकर्तालाई घरमा वोलाएर	N62	Where did you go for second treatment? (write the name of the place) ○ Janakpur zonal hospital ○ Other hospital _____ ○ Primary Health Care Centre _____ ○ Health Post _____ ○ Sub Health Post _____ ○ Mobile Village Clinic _____ ○ Medical college _____ ○ Family Planning Association _____ ○ Private clinic / nursing home _____ ○ Ayurvedic hospital _____ ○ Medicine shop _____ ○ Indian hospital or clinic _____ ○ Health camp _____ ○ Shaman's (Dhami jhangri's) house ____ ○ Other _____ ○ Called health worker to the house
(यदि घरमा नै वोलाएको भए प्रश्न नं. N ७० मा जानुहोस)		***If you called someone to your house go to question N70***
N ६३. तपाईलाई त्यहाँ जान भनियो कि आफै जानु भयो ? ○ जानु भनेर ○ आफै	N63	Did you go because someone told you to or because you thought you should go yourself? ○ Referred (someone told me to) ○ Decided to go for self
N ६४. त्यहाँ पुग्नको लागी तपाईले कुन साधान बढी प्रयोग गर्नु भयो ? ○ हिडेर ○ बोकेर ○ एम्वुलेन्स ○ कार/टेम्पो/बस/ट्रयाक्टर ○ रिक्सा ○ साइकल ○ मोटरसाइकल ○ स्ट्रेचर ○ रेल ○ वयल/टायर गाडा/टाँगा ○ साइकल एम्वुलेन्स	N64	Which form of transport did you use the most to get there? ○ Walking ○ Carried ○ Ambulance ○ Car / tempo / Bus / tractor ○ Rickshaw ○ Cycle ○ Motorcycle ○ Stretcher ○ Rail ○ Ox cart or horse trap ○ Cycle ambulance
N ६५. माथीको साधान बाहेक अन्य कुन कुन साधान प्रयोग गर्नु भयो ? □ हिडेर □ बोकेर □ एम्वुलेन्स □ कार/टेम्पो/बस/ट्रयाक्टर □ रिक्सा □	N65	Aside from the form of transport above what other means of transport did you use to get there? ⌟ Walking ⌟ Carried ⌟ Ambulance

साइकल ☐ मोटरसाइकल ☐ स्ट्रेचर ☐ रेल ☐ बयल/टायर गाडा/टाँगा ☐ साइकल एम्बुलेन्स		⌟ Car / tempo / Bus / tractor ⌟ Rickshaw ⌟ Cycle ⌟ Motorcycle ⌟ Stretcher ⌟ Rail ⌟ Ox cart or horse trap ⌟ Cycle ambulance
N ६६. विरमी भएको कति समय पछि त्यहाँ पुग्नभयो ? .... घण्टा वा .... दिन पछि ○ थाहा छैन	N66	How long after the illness started did you get there? __ __ hours __ __ days ○ Don't know
N ६७. उनीहरुले बच्चालाई उपचार गरेको थियो ? ○ थियो ○ थिएन	N67	Did they treat the baby? ○ Yes ○ No
(यदि भएन भने प्रश्न नं. N ७० मा जानुहोस)		***If no go to question N70***
N ६८. कस्तो उपचार गरे ?	N68	What treatment did they give? _____
N ६९. त्यहाँ पुगेको कति समय पछि उपचार पाउनु भया ? .... घण्टा वा .... दिन पछि ○ थाहा छैन	N69	How long long after reaching there did you get treatment? __ __ minutes __ __ hours ○ Don't know
N ७०. जम्मा जम्मी उपचार र यातायातको लागि कति खर्च गर्नु भयो ? रु.....	N70	Altogether for treatment and transport how much did you spend? Rs _____
N ७१. खर्च कसरी जुटाउनु भयो ? ☐ ज्याला ☐ बचतबाट ☐ जमिन बेचेर ☐ बस्तुभाउ बेचेर ☐ नातेदारबाट सापटी लिएर ☐ साहुसंग सापटी वा ऋण लिएर ☐ अन्य कोषबाट सापटी लिएर ☐ अन्य संस्थाबाट ☐ माइति धरबाट ☐ चन्दा दानबाट ☐ अन्न बेचेर ☐ गहना बेचेर	N71	How did you raise the money? ⌟ Labour ⌟ Savings ⌟ Selling land ⌟ Selling livestock ⌟ Loan from Relatives ⌟ Loan from landlord ⌟ Loan from savngs fund ⌟ From another organization ⌟ From parental home (maiti) ⌟ Donations ⌟ Selling grain ⌟ Selling jewellery

मिरा, धनुषा		MIRA DHANUSHA
GARIMA गरिमा प्रश्नावली : संक्रमण व्यबस्थापन मोड्युल		**GARIMA questionnaire: SEPSIS MANAGEMENT MODULE**
तलका अवस्थामा यो मोड्युल प्रयोग गर्नहोला - आमा र बच्चा २८ दिन सम्म जिबीतै भएमा - बच्चाको मृत्यु २८ दिन सम्म भएको र आमा जिउदै भएको - आमाको मृत्यु २८ दिन सम्म भएको र बच्चा जिउदै भएको - आमा र बच्चा दुबैको मृत्यु २८ दिन सम्म भएको		*Use this module in the following situations:* - *Mother and baby alive at 28 days* - *Mother Alive but baby dead at 28 days* - *Baby alive but mother dead at 28 days* - *Both baby and mother dead at 28 days*
मिराको कर्मचारीले तपाईलाई यो भन्दा अगाडी स्वयम सेबिकाको कामको बरेमा सोध्नु भएको थियो ? ◯ थियो ◯ थिएन		Has a MIRA employee asked you about the work of the FCHV before? ◯ Yes ◯ No
यदि थियो भने कहा ? गा.वि.स. नं .... वडा नं. ..... टोल		If yes where? VDC No ____ Ward no __ Tole _____
यदि थियो भने कहिले ? साल .... महिना		If yes when? Year ____ ____ Month ____ ____
DATABASE IDENTIFICATION INFORMATION		**DATABASE IDENTIFICATION INFORMATION**
अन्तरवार्ता लिने व्यक्तिको आई डी नं.		INTERVIEWER ID. __ __
अन्तरवार्ता लिईएको मिति : .... गते .... महिना ..... साल		DATE OF INTERVIEW __ __ / __ __ / __ __ __ __
अवलोकन गरेको ☐		INTERVIEW OBSERVED ☐
युनीट अफीसमा चेक भएको ☐		CHECKED IN UNIT OFFICE ☐
अन्तरवार्ता भईसकेको धरमा गाएर चेक भएको ☐		CHECKED BY RE-VISITING HOUSE WHERE INTERVIEW TOOK PLACE ☐

घरमुलीको नाम		Name of household head _____
गा.वि.स. नं .... वडा नं. ..... टोल		VDC no _____ Ward no ____ Tole _____
घरधुरी. नं		Household number _____
MW को परिचय नं :		MW (married woman's) ID number _____
MW को नाम.....		MW (married woman's) name _____
BABY ID बच्चाको परिचय नं :		BABY ID number _____

अर्न्तवार्ताको लागी अनुमती लिएको ☐		PERMISSION GRANTED FOR THE INTERVIEW ☐
अर्न्तवार्ताको लागी अनुमती दिनेको सही अथवा औठाको छाप (त्याप्चे):		Signature or thumbprint of person granting permission _____
क. मुख्य उत्तरदाताको नाम :.....	a.	Name of main interviewee _____
ख. मुख्य उत्तरदाता संग MW को नाता	b.	Relationship to the married woman _____
ग. अन्य उत्तरदाताको नाम :	c.	Name of other interviewee _____
घ. अन्य उत्तरदाता संग MW को नाता	d.	Relationship of other interviewee to the married woman _____
ङ. अन्तर्वार्ताको समयमा को-को उपस्थित हुनुहुन्थ्यो ? ☐ MW ☐ सासु ☐ ससुरा ☐ श्रीमान् ☐ ससुराली घरको अन्य महिला ☐ आमा ☐ बुवा ☐ माइतीका अन्य महिला ☐ महिला छिमेकी ☐ महिला साथी ☐ पुरुष छिमेकी ☐ अन्य ।	e.	Who was present at the interview? ☐ MW married woman herself (to whom the interview refers) ☐ Mother-in-law ☐ Father-in-law ☐ Husband ☐ Other women from husband's household ☐ Mother ☐ Father ☐ Other women from the parental household ☐ Female neighbour ☐ Female Friend ☐ Male neighbour ☐ Other
महिला स्वास्थ्य स्वयम सेबिकाको काम		**WORK OF THE FCHV**
SM १. बच्चा जन्मिएपछि महिला स्वास्थ्य स्वयम सेबिकाले तपाईलाई घरमा भेट्न आउनु भएको थियो ? ○ थियो ○ थिएन	SM1	Did the FCHV come to your home to see you after the baby was born? ○ Yes ○ No

SM २. बच्चालाई महिला स्वास्थ्य स्वयम सेबिकाले तौलिएको थियो ? ○ थियो ○ थिएन	SM2	Did the FCHV weigh the baby? ○ Yes ○ No
SM ३. कति पटक महिला स्वास्थ्य स्वयम सेबिकाले तपाईलाई भेट्न आउनु भयो ? ..... पटक	SM3	How many times did you see the FCHV? ___ ____ times
SM ४. महिला स्वास्थ्य स्वयम सेबिकाले तपाईलाई कुनै सल्लाह दिनु भएको थियो ? ○ थियो ○ थिएन	SM4	Did the FCHV give you any advice? ○ Yes ○ No
SM ४.१ यदि थियो भने के सल्लाह ?	SM4.1	If yes what advice? _____
SM ५. तपाईको बच्चा जन्मेको महिला स्वास्थ्य स्वयम सेबिकाले सुचना लिनुभएको थियो ? ○ थियो ○ थिएन	SM5	Did the FCHV make a record of the baby's birth? ○ Yes ○ No
SM ६. महिला स्वास्थ्य स्वयम सेबिकाले तपाईको बच्चाको समस्या पत्ता लगाउनु भएको थियो ? ○ थियो ○ थिएन	SM6	Did the FCHV find any problem with the baby? ○ Yes ○ No
SM ७. तपाईको बच्चालाई महिला स्वास्थ्य स्वयम सेबिकाले कुनै औषधी दिएको थियो ? ○ थियो ○ थिएन	SM7	Did the FCHV give any medicine to the baby? ○ Yes ○ No
(यदि थिएन भने प्रश्न नं. SM ८ मा जानुहोस्)		***If no go to question*** SM8
SM ७.१ यदि दिएको थियो भने कुन औषधी दिएको थियो ? ○ आमाको दूधमा औषधी मिसाएर ख्वाएको ○ जि.भि (प्याजी रंगको झोल) लगाएको ○ आँखामा राख्ने झोल ○ अन्य	SM7.1	If yes what medicine did she give? ○ Medicine mixed with mother's breastmilk ○ Applied Gentian violet (purple liquid) ○ Eye medicine ○ Other _____
SM ७.२ यदि दिएको थियो भने तपाईको बच्चालाई कति पटक महिला स्वास्थ्य स्वयम सेबिकाले आफै औषधी दिनु भयो ? .... पटक	SM7.2	If yes how many times did the FCHV give the medicine to the baby herself ? ___ ____ times
SM ७.३ तपाई वा तपाईको कुनै परिवारका सदस्यहरुलाई महिला स्वास्थ्य स्वयम सेबिकाले औषधी प्रयोग गर्ने बिधि सिकाएको थियो ? ○ थियो ○ थिएन	SM7.3	Did the FCHV teach you or any member of your family how to give medicine to the baby? ○ Yes ○ No
SM ७.४ महिला स्वास्थ्य स्वयम सेबिकाले दिएको औषधी तपाई आफैले वा तपाईको परिवारको सदस्यले बच्चालाई कति पटक दिनु भयो ? .... पटक	SM7.4	If yes how many times did you yourself (or family member) give the medicine that the FCHV gave you to the baby ? ___ ____ times

SM ८. महिला स्वास्थ्य स्वयम सेबिकाले स्वास्थ्य कार्यकर्तालाई तपाईको घरमा बोलाएको थियो ? ○ थियो ○ थिएन	SM8	Did the FCHV call a health worker to your home? ○ Yes ○ No
(यदि थिएन भने प्रश्न नं. SM ९ मा जानुहोस्)		***If no go to question*** SM9
SM ८.१ यदि थियो भने कस्लाई ? ○ अ.हे.व ○ मा.सि.का. ○ ग्रा.स्वा.का. ○ अन्य	SM8.1	If yes who did she call? ○ AHW ○ MCHW ○ VHW ○ Other _____
SM ८.२ उहाँले बच्चालाई सूई लगाउनु भएको थियो ? ○ थियो ○ थिएन	SM8.2	Did the health worker give your baby an injection? ○ Yes ○ No
SM ८.३ घरमा आएर कति पटक सूई लगाउनु भयो ? .... पटक	SM8.3	How many times did the health worker inject the baby? _____ times
SM ९. तपाईलाई महिला स्वास्थ्य स्वयम सेबिकाले विरामि बच्चालाई कतै लानको लागि सल्लाह दिनु भएको थियो ? ○ थियो ○थिएन	SM9	Did the FCHV advise you to take your baby somewhere? ○ Yes ○ No
(यदि थिएन भने प्रश्न नं. SM १० मा जानुहोस्)		***If no go to question SM10***
SM ९.१. यदि थियो भने कहाँ लानको लागि सल्लाह दिइयो ? ○ उप स्वास्थ्य चौकी ○ स्वास्थ्य चौकी ○ प्राथमिक स्वास्थ्य केन्द्र ○ जनकपुर अचंल अस्पताल ○ अन्य	SM9.1	If yes where did she advise you to take the baby? ○ Sub-health post ○ Health Post ○ Primary Health Care centre ○ Janakpur zonal hospital ○ Other _____
SM ९.२ उहाँले भनेको ठाँउमा तपाई जानुभएको थियो ? ○ थियो ○ थिएन	SM9.2	Did you go to the place she advised? ○ Yes ○ No
SM ९.३ महिला स्वास्थ्य स्वयम सेबिका पनी तपाई सँग सँगै जानु भएको थिया ? ○ थियो ○ थिएन	SM9.3	Did the FCHV accompany you to the place she advised? ○ Yes ○ No
SM १०. तपाईले बच्चालाई लगेको ठाँउमा स्वास्थ्य कार्यकर्ताले बच्चालाई सूई लगाएको थियो ? ○ थियो ○ थिएन	SM10	At the place you took the baby, did the health worker give your baby an injection? ○ Yes ○ No
(यदि थिएन भने प्रश्न नं. SM ११ मा जानुहोस्)		***If no go to question SM11***
SM १०.१ बच्चालाई स्वास्थ्य संस्थामा कति पटक सूई लगाएको थियो ? ..... पटक	SM10.1	How many times did the health worker inject the baby at the health facility? ___ ____ times
SM ११. यदि सूई लगाएको थिएन भने के गर्नु भयो ?	SM11	If they didn't inject the baby what did they do at the health facility?

.....		_____
अन्तरवार्ता समाप्त पछि धन्यबाद दिई नमस्कार भन्नुहोस ।		*END THE INTERVIEW BY THANKING THE RESPONDENT AND SAYING NAMASKAR*

MIRA Dhanusha Baby Verbal Autopsy

For stillbirths and neonatal deaths

	VDC ☐	**Ward** ☐	**Interviewer ID** ☐
	Tole		**Interview date** _ _ / _ _ / _ _ _ _ *day/month/year*
	Household ID ☐		**Field check** ☐
			Unit office check ☐
	Woman ID ☐		**Home check** ☐
	Woman's name	.....	

	Mother's status	Alive ☐	***Go to 2***	Died ☐
1.1	If mother has died, when did she die?	During delivery ☐	After delivery ☐	
	If during delivery, go to 1.3			
1.2	How many days after delivery did she die?	☐☐☐ *days*		
2	Name of main respondent	.....		
3	What is the relationship of the main respondent to the deceased baby?	Mother ☐		
		Father ☐		
		Paternal grandmother ☐		
		Paternal grandfather ☐		
		Paternal aunt ☐		
		Paternal uncle ☐		
		Maternal grandmother ☐		
		Maternal grandfather ☐		
		Maternal aunt ☐		
		Maternal uncle ☐	*Who? .....*	
		Other woman ☐	*Who? .....*	
		Other man ☐		
4	Age of main respondent	☐☐ *years*		
5	Were other people present at the interview?	Yes ☐	No ☐	***Go to 7***

6	Who was present?	Mother ☐	
		Father ☐	
		Paternal grandmother ☐	
		Paternal grandfather ☐	
		Paternal aunt ☐	
		Paternal uncle ☐	
		Maternal grandmother ☐	
		Maternal grandfather ☐	
		Maternal aunt ☐	
		Maternal uncle ☐	*Who? ……*
		Other woman ☐	*Who? ……*
		Other man ☐	*Who? ……*
		Birth attendant ☐	
	If mother has died, go to 8		
7	Why is the mother not the main respondent?	Mother does not live in household ☐	
		Mother is not present at interview ☐	
		Mother is not capable of answering ☐	
		Mother refused interview ☐	
		Other ☐	.....
8	Was anyone among the respondents present during the baby's illness and death?	Yes ☐	No ☐ ***Go to 9***
	Who?	Mother ☐	Yes ☐ No ☐
		Father ☐	Yes ☐ No ☐
		Paternal grandmother ☐	Yes ☐ No ☐
		Paternal grandfather ☐	Yes ☐ No ☐
		Paternal aunt ☐	Yes ☐ No ☐
		Paternal uncle ☐	Yes ☐ No ☐
		Maternal grandmother ☐	Yes ☐ No ☐
		Maternal grandfather ☐	Yes ☐ No ☐

		Maternal aunt ☐	Yes ☐	No ☐
		Maternal uncle ☐	Yes ☐	No ☐
		Other woman ☐	Yes ☐	No ☐
		Other man ☐	Yes ☐	No ☐
		Birth attendant ☐		

9	Baby's date of birth	_ _ / _ _ / _ _ _ _ *day/month/year*		
10	Baby's date of death	_ _ / _ _ / _ _ _ _ *day/month/year*		
11	Baby's name *if given*	……		
12	Baby's sex	Male ☐	Female ☐	
13	Where did the baby die?	Hospital ☐	Public health faciity ☐	
		On way to facility ☐	Home ☐	
		Other ☐	……	
13.1	If hospital or public health facility, which one?			
	Janakpur zonal hospital ……..	Other hospital ……..		
	Health post ……..	Primary Health Centre		
	Gau-ghar clinic ……..	Sub Health Post ……..		
	Family planning centre ……..	Medical college ……..		
	Ayurvedic hospital ……..	Private clinic or nursing home ……		
	Indian hospital or clinic ……..	Medicine shop ……..		
	Dhaami jhankri ……..	Shivir ……..		
		Other ……..		
14	We would like to know why and how the baby died, so please tell me about the pregnancy, delivery and baby. *Please tape record the answer if possible*			
	……			

15	After how many months of pregnancy was the baby born?	☐ *months*		
16	Was the baby born at the expected time?	Born early ☐	On time ☐	Born late ☐
17	Did the labour last for more than 24 hours?	Yes ☐	No ☐	
17.1	When did the waters break?	Before labour ☐	After labour ☐	***Go to 17.3***
		During labour ☐	Dk ☐	

17.2	How long before labour did the waters break?		☐☐☐ *hours*	☐ *days*
17.3	Was any medicine given to make the labour start?	Yes ☐	No ☐	dk ☐
17.4	Once it had started, was any medicine given to make the labour faster?	Yes ☐	No ☐	dk ☐

Newborn care

18 Where was the baby born? Dhanusha ☐ Outside Dhanusha ☐ *Where* ……

India ☐ Panchayat …… District ……

Other country ☐ ……

18.1 In what sort of place? Home ☐ Health facility ☐ On the way to health facility ☐

If outside home go to 18.4

18.2 Whose home? Sasurali ☐ Maiti ☐ Bhaadaako ☐ Relative ☐

Other ☐

18.3 Where in the home? Special room ☐ Sleeping room ☐ Porch or yard ☐

Fields or work ☐ Cattle room ☐

18.4 If hospital or public health facility, which one?

Janakpur zonal hospital ……..
Health post ……
Gau-ghar clinic ……
Family planning centre ……..
Ayurvedic hospital ……
Indian hospital or clinic ……
Dhaami jhankri ……

Other hospital ……..
Primary Health Centre
Sub Health Post ……
Medical college ……
Private clinic or nursing home ……
Medicine shop ……
Shivir ……
Other ……

19 What time was the baby born? ☐☐☐☐ *o'clock AM or PM*

20 How was the baby born? Normal birth ☐ Manual delivery ☐ Forceps ☐ C-Section ☐

If not C-section, go to 21

20.1 Was the C-section planned in advance? Yes ☐ No ☐ *Now go to 22*

21 Which part of the baby came out first?

Head ☐ Breech ☐ Limb ☐ Cord ☐ Don't know

☐

22 Who helped with the delivery?

Doctor ☐
Staff nurse ☐
HA ☐
ANM ☐
AHW ☐
MCHW ☐
VHW ☐
FCHV ☐
TBA ☐
Mother-in-law ☐
Family member ☐
Friend or neighbour ☐
Medicine shopkeeper ☐
Home practitioner ☐
Alone ☐
Dhaami jhankri ☐
Other ☐ .....

23 Was there a fire or stove in the delivery place? Before delivery ☐ After delivery ☐ Before and after delivery ☐ No ☐ Don't know ☐

24 Did the assistant wash her hands? Yes ☐ No ☐ Don't know ☐

25 Do you know what a home delivery kit is? Yes ☐ No ☐ ***Go to 28***

26 Did you use a home delivery kit? Yes ☐ No ☐ ***Go to 28***

27 Where did you get the kit? Shop ☐ MCHW ☐ TBA ☐ Mothers' group ☐ Health facility ☐ Don't know ☐ Other ☐

28 Was the baby a single or multiple birth?

Single ☐ Twin ☐ Triplet ☐

If a single baby, go to 30

29 *Was this baby born first, second or later?* First born ☐ Second born ☐ Third ☐

29.1 If twin or triplet, how long after the first baby was the second or third baby born?

Second ☐☐ *minutes* or ☐☐ *hours* Third ☐☐ *minutes* or ☐☐ *hours*

30 Did the baby look normal? Yes ☐ No ☐

30.1 If abnormal, in what way? ……

31 Did the baby have a very small head at the time of birth? Yes ☐ No ☐

32	Was there a mass or defect on the back of the head or spine?		Yes ☐	No ☐	
33	Were there any bruises or marks of injury on the baby's body at birth?		Yes ☐	No ☐	
34	Were there any limb defects?		Yes ☐	No ☐	
35	How big was the baby when he/she was born?		Tiny ☐ Smaller than usual ☐	About average ☐ Larger than most babies ☐	
36	Was there a cleft lip or palate?		Yes ☐	No ☐	Don't know ☐
37	Was the baby born alive or dead?		Alive ☐	***Go to 48***	No ☐
38	Did the baby ever move after birth?	Yes ☐	***Go to 40***	No ☐	
39	How long before birth did the baby last move?		Hours before labour ☐	Days before labour ☐	
40	Do you think the baby had died before labour started?		Yes ☐	No ☐	
41	Did the baby cry at all?	Yes ☐	No ☐		
42	Did the baby ever move?	Yes ☐	No ☐		
43	Did the baby ever breathe?	Yes ☐	No ☐		
44	Did the baby look like other babies, or had the baby's body changed so that the skin was soft and pulpy or discoloured?		Yes ☐	No ☐	Don't know ☐
45	Was the baby stillborn?		Yes ☐	No ☐	
46	Was anything done to try to help the baby to breathe at birth?		Yes ☐	No ☐	Don't know ☐
	If no or don't know, stop interview				
47	What was done?	Stimulated to make baby cry ☐		Tube and mask ☐	
		Mouth to mouth ☐		Bag and mask ☐	
	Stillbirths stop interview				

48	Do you know the weight of the baby?	☐☐.☐☐ *Kg*		
	Weight taken but not known ☐	Weight not taken ☐		
49	What was the cord cut with?	Boiled blade ☐		Bamboo ☐
		Unboiled blade ☐		Don't know ☐
		Knife, scissors ☐		Other ☐

			Sickle, woodknife ☐	Cord not cut ☐
50	Was the cord stump dressed?		Yes ☐	No ☐
51	What was it dressed with?		Oil ☐ Turmeric ☐ Medicine, dettol ☐ Powder ☐ Mud ☐	Dung ☐ Nothing ☐ Washed cloth ☐ Unwashed cloth ☐ Don't know ☐ Other ☐ ……
52	How long after birth was the baby wrapped?		Immediately ☐ Within half an hour ☐	After half an hour ☐ Never ☐
53	How long after birth was the baby bathed?		Within an hour ☐ Within the first 24 hours ☐	After 24 hours ☐ Never ☐
54	What was the first food given to the baby?		Breastmilk ☐ Another woman's milk ☐ Cow, buffalo milk ☐ Goat milk ☐ Lactogen ☐ Tea or herbal water ☐ Ghee, sugar, honey ☐ Oil ☐ Water ☐ Honey ☐	Fruit juice ☐ Sugar, honey, sweets, glucose ☐ Baby food ☐ ORS ☐ Medicine or vitamin drops ☐ Other fluid ☐ Other ☐ …… Don't know ☐ Nothing at all ☐
55	Has the baby had BCG injection?	Yes ☐	No ☐	Don't know ☐
56	Did the baby cry immediately after birth?	Yes ☐	***Go to 58***	No ☐
57	How long after birth did the baby first cry?		Within 5 minutes ☐ After 30 minutes ☐	Within 5-30 minutes ☐ Never ☐
58	Was anything done to try to help the baby to breathe at birth?		Yes ☐	No ☐ ***Go to 60***
59	What was done?	Stimulated to make baby cry ☐ Mouth to mouth ☐		Tube and mask ☐ Bag and mask ☐
60	Was the baby floppy and sleepy at birth?		Yes ☐	No ☐

61	During the illness, did the baby have difficult breathing?	Yes ☐	No ☐ ***Go to 70***	dk ☐	***Go to 70***
62	What was the breathing problem?	Periods of not breathing ☐		Fast breathing ☐	
63	When did the difficult breathing start?	From birth ☐	Within 6 hours ☐	After 6 hours ☐	
64	How long did the difficult breathing last?			☐☐ *hours* or ☐☐ *days*	
65	Did the breathing problem continue until the baby died?			Yes ☐	No ☐
66	During the illness, did the baby have indrawing of the chest? *Demonstrate*	Yes ☐	No ☐	dk ☐	
67	During the illness, did the baby have grunting? *Demonstrate*	Yes ☐	No ☐	dk ☐	
68	During the illness, did the baby's nostrils flare with breathing? *Demonstrate*	Yes ☐	No ☐	dk ☐	
69	During the illness, did the baby have pneumonia?	Yes ☐	No ☐	dk ☐	
70	Did the baby feed well?	Yes ☐	***Go to 77***	No ☐	
71	*When did the feeding problem start?*	On the first day ☐	*From* ☐☐ *days*		
72	How long did the feeding problem continue?			☐☐ *hours* or ☐☐ *days*	
73	Did the feeding problem continue until the baby died?		Yes ☐	No ☐	
74	Could the baby open his/her mouth?		Yes ☐	No ☐	
75	Did the baby arch his/her back and have spasms?		Yes ☐	No ☐	
76	Did the baby have tetanus?	Yes ☐	No ☐	dk ☐	
77	During the illness, did the baby have frequent loose or liquid stools? (watery/green/foulsmelling)	Yes ☐	No ☐	dk ☐	
78	During the illness, did the baby have diarrhoea?	Yes ☐	No ☐	***Go to 81***	
78.1	When did the diarrhoea start?			☐☐ *hours* or ☐☐ *days*	
79	How long did the baby have diarrhoea?			☐☐ *hours* or ☐☐ *days*	
80	During the illness, was there visible blood in the stools?			Yes ☐	No ☐
81	During the illness, did the baby vomit everything?			Yes ☐	No ☐
82	During the illness, did the baby have a fever?	Yes ☐	No ☐	***Go to 85***	

83	How old was the baby when the fever started?		☐☐ *hours* or ☐☐ *days*	
84	How many days did the fever last?		☐☐ *hours* or ☐☐ *days*	
85	Did the baby's skin and eyes look very yellow (jaundice)?		Yes ☐	No ☐
86	During the illness, did the baby have fits or convulsions?	Yes ☐	No ☐	***Go to 88***
87	On what day did the fits start?	First day ☐	Later ☐	
88	During the illness, did the baby become cold to touch?	Yes ☐	No ☐	***Go to 91***
89	How old was the baby when he/she became cold to touch?	From birth ☐	*From* ☐☐ *hours* or ☐☐ *days*	
90	For how many days did the baby feel cold to touch?		☐☐ *hours* or ☐☐ *days*	
91	Did the baby have boils or pimples on the skin?		Yes ☐	No ☐
92	Did the baby have ear discharge?		Yes ☐	No ☐
93	Did the baby have redness of and drainage of pus from the eyes?		Yes ☐	No ☐
94	During the illness, did the baby have redness around the umbilical cord stump?		Yes ☐	No ☐
95	During the illness, did the baby bleed from anywhere?	Yes ☐	No ☐	***Go to 97***
96	From where? ……			
97	How did the baby's fontanelle look?	Sunken ☐	Normal ☐	Bulging ☐
98	During the illness, did the baby become lethargic after a period of normal activity?	Yes ☐	No ☐	
99	How long was the baby ill before she died?		☐☐ *hours* or ☐☐ *days*	
99.1	Did the baby die from an injury or accident?	Yes ☐	No ☐ ***Go to 100***	Don't know ☐ ***Go to 100***
99.2	What kind of injury or accident?			

Motor vehicle accident ☐
Fall ☐
Drowning ☐
Poisoning ☐
Bite or sting from venomous animal ☐
Burn ☐
Violence ☐
Other ☐ *what?* ……
Don't know ☐

99.3	How long did the baby survive after the injury or accident?	

		Died in 24 hrs ☐	Died after a day or more ☐
100	Did the baby suddenly die without showing signs of illness?	Yes ☐	No ☐
101	Did the baby have any other problems you'd like to add?	Yes ☐	No ☐ ***go to 103***
101.1	What sort?	……	
102	Was the baby well on the day of birth?	Yes ☐	No ☐

Breastfeeding

103	Was the baby breastfed?	Yes ☐	***go to 104***	No ☐
103.1	Why not?			
		No milk ☐		Baby could not breastfeed ☐
		Mother is dead ☐		Baby was dead ☐
		Mother was unwell ☐		Other ☐ ……
	Now go to 106			
104	How long after birth did you first breastfeed the baby?	Within one hour ☐		Within 3 days ☐
		Within 6 hours ☐		Within 4 days ☐
		6 to 24 hours ☐		After 4 days ☐
		Within 2 days ☐		
105	Did you discard the first milk?		Yes ☐	No ☐
106	Apart from breastmilk, did you give the baby any other sort of fluids?		Yes ☐	No ☐ ***Go to 107***
106.1	What sort of fluids?			
		Another mother's milk ☐		Sugar, honey, glucose ☐
		Cow or buffalo milk ☐		Honey ☐
		Goat's milk ☐		Baby food ☐
		Lactogen ☐		Fruit juice ☐
		Tea or herbal water ☐		ORS ☐
		Ghee, sugar, honey ☐		Medicine or vitamin drops ☐
		Oill ☐		Other fluids ☐

Water ☐ Other ☐ ……

DK ☐

Health care

107	Did you seek care for the baby?	Yes ☐	No ☐	***Go to 109***
108	Why not?	***……***		
109	Was the baby treated at home by anyone other than a health worker?	Yes ☐	No ☐	***Go to 110***
109.1	What did you do?	***……***		

110 Who did you seek treatment from first? *Tick only one which was the very first*

Doctor ☐	FCHV ☐	
Staff nurse ☐	TBA ☐	
HA ☐	Dhaami jhankri ☐	
ANM ☐	Medicine shop ☐	
AHW ☐	Home practitioner ☐	
MCHW ☐	Friend or neighbour ☐	
VHW ☐	Other ☐	.....

111 Where did you go first for treatment?

Janakpur zonal hospital ……	Other hospital ……
Health post ……	Primary Health Centre
Gau-ghar clinic ……	Sub Health Post ……
Family planning centre ……	Medical college ……
Ayurvedic hospital ……	Private clinic or nursing home ……
Indian hospital or clinic ……	Medicine shop ……
Dhaami jhankri ……	Shivir ……
Called health worker to home ……	Other ……

If they called a health worker to her home, go to 96

112 How did you get there?

Walked ☐ Motorcycle ☐
Carried ☐ Stretcher ☐
Ambulance ☐ Train ☐
Car, tempo, bus, tractor ☐ Cart, tanga ☐
Rickshaw ☐ Cycle ambulance ☐
Cycle ☐

If they only used one method of transport, go to 114

113 Apart from the above, did you use any other method of transport?

Walked ☐ Motorcycle ☐
Carried ☐ Stretcher ☐
Ambulance ☐ Train ☐
Car, tempo, bus, tractor ☐ Cart, tanga ☐
Rickshaw ☐ Cycle ambulance ☐
Cycle ☐

114 What sort of treatment was given? ……..

115 How long after the baby became ill did you decide to seek care? ☐☐ *hours* or ☐☐ *days* or dk ☐

116 How long after the baby became ill did you reach there? ☐☐ *hours* or ☐☐ *days* or dk ☐

117 How long after you reached there did the baby get treatment? ☐☐ *minutes* or ☐☐ *hours* or dk ☐

118 Did you then go to another place for treatment? Yes ☐ No ☐ ***Go to 126***

119 Was the baby referred or did you go of your own accord? Referred ☐ Own accord ☐

120 Where did you go for treatment?

Janakpur zonal hospital ……
Health post ……
Gau-ghar clinic ……
Family planning centre ……
Other hospital ……..
Primary Health Centre
Sub Health Post ……
Medical college ……
Private clinic or nursing home ……

	Ayurvedic hospital ……	Medicine shop ……
	Indian hospital or clinic ……	Shivir ……
	Dhaami jhankri ……	Other ……
	Called health worker to home ……	
121	How did you get there?	
	Walked ☐	Motorcycle ☐
	Carried ☐	Stretcher ☐
	Ambulance ☐	Train ☐
	Car, tempo, bus, tractor ☐	Cart, tanga ☐
	Rickshaw ☐	Cycle ambulance ☐
	Cycle ☐	
	If they only used one method of transport, go to 123	
122	Apart from the above, did she use any other method of transport?	
	Walked ☐	Motorcycle ☐
	Carried ☐	Stretcher ☐
	Ambulance ☐	Train ☐
	Car, tempo, bus, tractor ☐	Cart, tanga ☐
	Rickshaw ☐	Cycle ambulance ☐
	Cycle ☐	
123	How long after the baby became ill you decide to go for this second treatment?	☐☐ *hours* or ☐☐ *days* or dk ☐
124	How long after the baby became ill did you reach there?	☐☐ *hours* or ☐☐ *days* or dk ☐
125	How long after you reached there did the baby get treatment?	☐☐ *minutes* or ☐☐ *hours* or dk ☐
126	What sort of treatment was given?	……
127	Altogether, for treatment and transport how much did you spend?	Rs ……
128	How did you raise the money?	

☐ Labour	Rs ……
☐ Savings	Rs ……
☐ Selling land	Rs ……
☐ Selling livestock	Rs ……
☐ Loan from relatives	Rs ……
☐ Loan from landlord	Rs ……
☐ Loan from MIRA savings fund	Rs ……
☐ From another organization	Rs ……
☐ From maiti	Rs ……
☐ Donations	Rs ……
☐ Selling grain	Rs ……
☐ Selling jewellery	Rs ……
☐ Other	Rs ……

APPENDIX E: CLASSIFICATION SYSTEM FOR STILLBIRTH AND CAUSE OF NEONATAL DEATH

Criteria	Classification
Infant did not breathe, cry or move at birth AND (weighed <1000g at birth, OR born at <28 weeks gestation)	**Stillbirth**
Infant breathed, cried or moved at birth, but died before 28 complete days	**Neonatal death:**
One or more of the following: ▪ Death within 4 hours of birth. ▪ Gestational age >36 weeks and not able to breathe normally at birth. ▪ Not able to suckle normally at birth with convulsions or spasms, but not tetanus or fever. ▪ (Supportive criteria: history of prolonged labour, malpresentation, twin, very large baby).	1. Birth asphyxia
One or more of the following: ▪ Fever or cold, and limp or lethargic. ▪ Convulsions ▪ Bulging fontanelle and refusing to feed, with no localizing signs. ▪ Chest indrawing or difficulty breathing with duration >1 day. ▪ Umbilical area red or discharging pus, or skin red, inflamed and hot, or skin rash with pustules/pus and fever >1 day. ▪ Age 3-27 days with convulsions or spasms, was able to suckle and cry normally after birth and subsequently stopped suckling or crying. ▪ (Supportive criteria: use of unclean instruments to cut the cord, red and discharging umbilicus, not completed tetanus toxoid immunization course).	2. Severe infection
▪ Birth weight <2500 g OR infant reported to be smaller than usual at birth if weight unknown OR age <36 weeks.	3. Prematurity or low birth weight
▪ Especially in winter months, with history of having been bathed immediately after birth	4. Hypothermia
▪ Gross visible malformation, such as meningomyelocele, anencephaly, gastroschisis	5. Congenital malformation
▪ Bruises or marks of injury on body or head at birth ▪ (Supportive criteria: prolonged labour, obstructed labour, instrumental delivery)	6. Accident or external condition
▪ Above conditions not fulfilled and due to other reasons	7. Others
▪ Cause could not be ascertained due to lack of information	8. Unclassifiable

APPENDIX F: TOPIC GUIDE FOR SEMISTRUCTURED INTERVIEWS AND FOCUS GROUP DISCUSSIONS WITH MOTHERS

- **Introductions** – informal conversation.
- **Go through information sheet.**
- **Go through verbal consent discussion.**

- **Background of mother:**
    - Please can you tell me a little bit about your children? How many do you have now? Which one was the child that MIRA interviewed you about on their last visit? How are all your children now?

Last year, one of the questions that the interviewer from MIRA asked you was "Before feeding the baby for the first time, did you squeeze and throw the milk?" What did you understand this question to mean?

- **Please can you tell me about what you did with the first breastmilk when first feeding your baby?**
    - *Probe:* did you do anything like throwing away any milk before starting to breastfeed your baby? Do you remember any details of what you did?
- **Please, as much as possible, can you explain to me why you chose to do these things that you have told me about with the first breastmilk?**

If necessary: further questions about advice the mother may have received regarding first breastmilk -

- **What advice, if any, did you receive from other people about what to do with first breastmilk?**
    - *Prompt:* If someone else was present at the birth of your child, do you remember if they gave you any advice about what to do with the first breastmilk?
    - *Prompt:* Did you go for antenatal care check-up? Did they give you any advice about feeding of first milk to the baby?
    - *Prompt:* What influence, if any, do you feel this advice had on your decisions about the first breastmilk?

- **Do you have any sisters? Do you know what they did with the first breastmilk before feeding the baby?**

- **What is your impression of what the other mothers in the local community might be doing with first breastmilk when they start to breastfeed their babies?**

- **For the new baby's health, what do you feel is the best practice to do with the first breastmilk?**

(Change added 22/04/2009) ***Now I need to ask you about the words 'khil' and 'bigouti'.***

- **How do you understand the meaning of the word 'khil'?**
  - *Prompt:* What do you think about 'khil'?
- **How do you understand the meaning of the word 'bigouti'?**
  - *Prompt:* What do you think about 'bigouti'?
- **What do you feel are the differences between khil and bigouti?**

(Change added 21/04/2009) ***Now I need to ask another short question about how you breastfed the baby in the first few days after birth.***

- **Can you tell me about how you were breastfeeding in the following days after birth?**
  - *Prompt:* Can you tell me about what you were doing with the milk before each feed of the baby in the first few days after birth?

Finishing:

- **Is there anything else that you would like to say?**

- **Do you have any questions?**

- **(If necessary arrange to complete the rest of the interview at a later time that day if we didn't finish during the first visit).**

- **Remind mother:**
  - What we will do with this information.
  - If they have any further questions, they can contact us at any time at the contact details in the information sheet.

Thank you for your time.

APPENDIX G: TOPIC GUIDE FOR SEMISTRUCTURED INTERVIEWS WITH VDC INTERVIEWERS

- **Introductions** – informal conversation.

- **Show VDCI the mother/participant information sheet, explaining that we're trying to find out what mothers in Makwanpur are doing with first breastmilk and why, but we're also interested to know how the SERMI question about first breastmilk was asked to the mother by the VDCI.**

- (Reminder that this is not an assessment or interrogation into how good the VDCI was at their job! We just want to know how they asked the SERMI breastfeeding question - there is no right or wrong answer).

- **Go through verbal consent discussion.**

Topics:

- **Background of VDCI:**
    - Please can you tell me a little bit about yourself?
        - *Prompt:* How long have you been living here in this VDC?
        - *Prompt:* Since when were you first working with MIRA?
        - *Prompt:* What has been your experience of asking mothers the SERMI questionnaire?

One of the questions that you asked mothers in the MIRA SERMI questionnaire was "before feeding the baby for the first time, did you squeeze and throw the milk?" What did you understand this question to mean?

- **Please can you tell me how you were asking this question to the mother?**
    - *Prompt:* did you ever have to explain the meaning of this question to the mother?

- **What kinds of responses did the mothers give to this question?**

- **The MIRA SERMI questionnaire only allowed a "yes" or "no" choice to this question "before feeding the baby for the first time, did you squeeze and throw the milk?" In which kinds of situation did you mark a mother's response as a "yes" and in which kinds of situation did you mark a "no"?**

- **Do you remember if you were ever unsure whether to classify a mother's response as a "yes" or a "no"?**
    - *Prompt:* If you were ever unsure, what did you do in such situations?
    - *Prompt*: did you have any other problems with this question in SERMI?

Finishing:

- **Is there anything else that you would like to say?**

- **Do you have any questions?**

- **(If necessary arrange to complete the rest of the interview at a later time that day if we didn't finish during the first visit).**

- If VDCI likes, or if they have any further questions, we can give them a copy of the mother/participant information sheet which has our contact details on it.

Thank you for your time.

APPENDIX H: SELECTION OF TRANSCRIPTS FROM QUALITATIVE DATA COLLECTION

H-1: Mother Interview 3

Date of the interview: June 10, 2009

Total time in recording: 8 minutes 23seconds

Place of interview: VDC 19 (Markhu), Ward number 1 , Mother 3

The interview took place in a shop owned by the mother. It took the interviewer 30 minutes to reach the mother's house from Markhu town, in MIRA's office vehicle. MIRA had provided its office vehicle. Prior to the interview, biscuits were offered to her and her family, to create a friendly environment. The mother wasn't shy unlike the other mothers. She was a teacher teaching in a nearby school. She also happened to be the VDCI's wife. The interviewer and the mother were sitting facing each other, with a tape recorder and a digital recorder in between. To make the mother feel at ease the VDCI didn't' sit for the interview. No onlookers were present during the interview.

Glossary

Didi: an elder sister in nepali language

Dai: an elder brother in nepali language

Sasu aama: mother-in-law in nepali language

Jethani: husband's sister in nepali language

Khil: nepali word for pus or pimple, or like cork in a bottle, also used for the first stale milk or pus like milk that may come from engorged breasts.

Bigouti: nepali word for "colostrums".

Khai: common expression to "I don't know"

Suru/pahilo: means 'first' in Nepali

KEY

...	Short pause
.....	Long pause
[laughter]	Laughter
(_____)	Long silence
[ ]	Words undeciphered
-[	Simultaneous or interrupted speech
I	Interviewer
M	Mother

ACRONYMS

MIRA Mother and Infant Research Activities

VDC I Village Development Committee interviewer

FCHV Female Community Health Volunteer

I: didi, can you tell me something about your children? How many children do you have?

M: I have two children. First one is daughter, and this time's its son.

I: oh. When dai had questioned you after you gave birth, was it in the time of your small son or your daughter?

M: it was in daughter's time.

I: in daughter's time? Oh. At that time there were lots of questions, right?

M: yes, there were lots of questions.

I: and out of all those questions, there was this one question, "before breastfeeding your baby for the first time, did you squeeze and throw the bigouti milk?" how did you understand that question as?

M: that question?

I: yes

M: even before before when I had not given birth I had heard that bigouti milk must not be thrown. And that the milk is very good for the baby. I had already heard before, right?

I: yes

M: and so obviously I knew it after giving birth. And then I didn't throw.

I: oh. And what did you think that the question was trying to tell you?

M: that question?

I: yes. What did you think that the question was trying to ask you?

M: some people throw. Those who throw, say they threw, and those who feed, say they fed. If they have thrown, then baby didn't get to have the first yellow milk, and since that baby didn't get to have, the baby might get diseases. Like this thing can be known that's why.

I: you mean to say like this thing will come to know that's why?

M: yes

I: but before feeding, did you do anything?

M: to the milk? (She may have meant breast)

I: yes

M: I heated them all and only after that I fed the bigouti milk.

I: oh ok.

M: I small small khils (the khils which are small. She just happened to repeat the word small twice.)That is there in the holes, yes only after taking that out, the milk comes much for the baby.

I: oh ok

M: until the khil is thrown, the milk (can be breast) is *tamart dairaicha.*

I: what means *tamart dairaicha?*

M: while squeezing the breast, even khil comes out.

I: oh

M: and after throwing them all (khil), the milk comes nicely (without any problem, the milk comes)

I: oh ok.

M: for the baby

I: and how is khil like?

M: the pimples that we have, when we squeeze it, ya some what similar to like that comes out.

I: oh ok.

M: (smiling)

I: and how is bigouti milk like, didi?

M: bigouti milk is yellow.

I: oh ok.

M: and when we touch with our hands, its chaap-chaap (sticky)

I: oh ok. And what impressions do you have towards bigouti milk?

M: you mean bigouti milk?

I: yes.

M: that means the baby won't get ill often. And the milk has the ability to fight the disease (illness).

I: oh ok-

M:[the bigouti milk has.

I: oh ok. You fed the baby milk. Can you tell me why did you do this?

M: yes?

I: why did you do this?

M: the milk must be fed. If the milk is not fed, it affects even me.

I: oh ya?

M: yes, if not fed, it affects even me. If it's not fed, it matures insides itself, and it will need to be operated. It matures insides.

I: oh ok.

M: first time when the baby sucks, it pains. It pains a lot. But I bared. (the pain) and fed.[smiling]

I: (smiling) … had you gone for antenatal check-up?

M: yes, I had gone.

I: when you had gone for antenatal check-up, did you receive any advice on what you should do with the first milk?

M: yes.

I: what kind of advice had you received?

M: advice?

I: yes

M: I had gone five or six times.

I: oh.

M: I went five or six times. MIRA's mother group that used to happen sometimes, from there too I learnt a lot. They used to talk a lot on mother and babies. And also that the first milk shouldn't be thrown. It shouldn't be squeezed and thrown. The first milk should be fed. And all these things [ ] learnt [ ]

I: oh ok. And didi, at the time when you gave birth, was there anyone with you?

M: at the time, when I gave birth?

I: yes

M: at home?

I: yes. Who all were present?

M: all the family members were there.

I: oh ya? (smiling)

M: when my eldest daughter was born, I gave birth at home itself. And about small son, I gave birth in Kathmandu.

I: whoever were present with you at the time when you gave birth, had they given you any advice on what you should do with the first milk?

M: our sasu, didi everyone were there at home. Even the neighbours had come.

I: oh ok.

M: before before, the people from earlier times didn't know. From the mother's group, we got lots of information and even the sasu had already known everything, that after the baby is born, we have to do this. Everything had been learnt. It had been easy.

I: oh ok. For the baby's health which practice do you think is the best to do with the first milk?

M: [ ]

I: like what kind of practices? What do you think should be done with the first milk, for a baby's health?

M: according to what I have understood,

I: yes

M: I have also already given birth to two [smiling]. That milk is not supposed to be thrown. After feeding, it gives the baby like strength; the milk also has the resistance to fight the diseases.

I: oh ok

M: I tell everyone, not to throw the milk (bigouti milk)

I: oh ok. In your local community, I'm sure you know the people, you interact with them, your home, and your maiti also happened to be near.

M: yes, it's near (smiles)

I: do you know what the mothers in the local community are doing with their first milk before breastfeeding the baby for the first time?

M: before breastfeeding for the first time?

I: yes.

M: before breastfeeding the baby, the breast must be washed with hot water, we must not feed straight away. There may be germs, because of delivery, there may be blood as well. So, it must be washed first. And after washing, we must have the baby suck it soon.

I: and what do you think they are doing?

M: in our village?

I: yes.

M: right now, most of them have already come to know. About that thing. When MIRA is not functioning, most of them didn't know. Right now, because of MIRA, everyone knows that they have to do this this. Right now, most of them have already become clever. If pregnant, the daughter-in-law is sent to the health post immediately, and if they have crossed the time little bit, they admit them. over here, there is mid-wife, FCHV in the village.

I: yes

M: yes, they are called immediately. They are doing that.

I: and didi, do you have sisters?

M: yes. I have elder sister. She is not here right now, she is in Dhangadi.

I: I'm sure she has already married, right?

M: yes, she has two sons.

I: oh, do you know what she did with her first milk, before breastfeeding the baby for the first time?

M: even she did the same thing.

I: same thing meaning?

M: same thing meaning, the first milk (she said the exact thing: su-ru ko dudh) wasn't thrown. It was fed to the baby.

(Vani says: First: suru , pahilo. Milk: dudh. So when there are lines said by me, where the words “first milk” are being used, I have used the words suru ma auune dudh(the milk that comes first), suru ko dudh (the first milk))

(Vani says: When mothers have used the words “first milk”, they have either used the word suru or pahilo in nepali, which means the same thing.)

(Vani says: When the mothers have said bigouti, I have written bigouti, when the mothers have said bigouti milk, I have written bigouti milk, and when the mothers have used the words first milk, I have written first milk and vice-versa).

I: oh ok. After the baby was born, you washed with hot water. And you also fed the first milk straight away and the days following that, before breastfeeding your baby each time, how were you breastfeeding?

M: to the baby?

I: yes

M: I don’t feed the baby in sleeping position. Because, the milk might go in ears. I have heard people telling that if it goes in ears, it will mature (the sore will mature and ripen) and it will never be alright and that’s why I feed in straight position, by keeping the baby on lap.

I: and before breastfeeding, what were you doing with the milk?

M: I used to wipe and clean the breast with water before breastfeeding.

I: and didi, now, I’m sure you would like to say and ask something.

M: khai, what to ask (smiles)

I: would you like to say something?

M: I don’t have any questions.

I: oh ok. Didi, thank you so much.

H-2: Mother Interview 10

Date of the interview: May 18, 2009

Total time in recording: 11 minutes

Place of interview: VDC 13 (Hatiya) ward no.9. Mother 10.

The interview took place in one of the mother's room. The tape recorder and a digital recorder were placed in between the interviewer and the mother. Her child was playing around in the room. To make the mother feel comfortable, biscuits were offered to the mother, and her family and around 10 minutes of interaction took place prior to the interview. Furthermore, to make her feel at ease Pascal Odent and the VDC I didn't sit for the interview. (Pascal note: this was a somewhat wealthy household – owned a shop, television, nice furniture etc. The mother was relatively well educated).

Glossary

Didi: an elder sister in nepali language

Khil: nepali word for pus or pimple, or like cork in a bottle, also used for the first stale milk or pus like milk that may come from engorged breasts.

Bigouti: nepali word for "colostrums".

Khai : common expression to "I don't know"

Khoi: another way of saying khai.

KEY

...	Short pause
.....	Long pause
[laughter]	Laughter
(_____)	Long silence
[ ]	Words undeciphered
I	Interviewer
S	subject

ACRONYMS

MIRA Mother and Infant Research Activities

VDC I Village Development Committee interviewer

FCHV Female Community Health Volunteer

I: didi can you tell me something about your children?

M: what to say about the children?

I: like how many children do you have? How many sons and daughters do you have?

M: I have two daughters, sons… two. First I gave birth to two daughters. And after that I had given birth to two sons. That son died in motorcycle accident after he reached 15years. Due to compulsion, another son was born. [ ] and everyone was happy when I gave birth to son [ ]

I: and right now, how is your children's health?

M: right now, they are fine.

I: that dai, who was sitting here earlier, when he had come,about which child was the interview about?

M: it was about this son, Bikalpa.

I: oh. That dai had questioned you, "before first breastfeeding your baby, did you squeeze and throw the bigouti milk?", he had questioned you right?

M: yes

I: what do you think the question was trying to ask?

M: the first milk mustn't be given. Why is he saying that, I used to feel? It is said that if we give the animal's bigouti, one gets diarrhea. Why it is said, I used to feel.

I: and what do you think the question is trying to say?

M: khai, why? Why? I didn't understand that, and sir himself used to explain it.

I: before breastfeeding your baby with the first milk, for the first time, what did you do with the first milk?

M: that I milked on the cloth.

I: can you tell that again clearly?

M: after milking on the cloth, I threw it, and then I washed it with hot water and fed the baby.

I: in the beginning, after you gave birth , what did you do can you tell again?

M: wash it with hot water, after washing, milk it on the cloth, and then throw it.(she washed it with hot water, and after washing she milked her breastmilk on the cloth and then she threw the milk that was on the cloth)

I: what do you mean by milking after washing?

M: to milk on the cloth and then to throw it. And after that to wash.

I: you mean to say you took the milk out?

M: yes, on the cloth.

I: you took the milk out on the cloth and you threw the milk?

M: yes.

I: oh. And after how long did you feed the milk?

M: one hour or half an hour after doing that.

I: oh. And why did you do this?

M: because we must not feed the dirt, the baby might catch diseases that’s why.

I: and do you have sisters?

M: I have two elder sisters. The eldest is who was sitting here and the second one stays with mother down there in Rangashala. Since

[ ] sisters take care of mother.

I: they must have already given birth, right?

M: she has three. Two sons and one daughter are already married. Only one son is married, the other son has gone abroad to work.

I: what did she do with her first milk, before breastfeeding the baby for the first time?

M: that I don't know. It was longtime back. Every one has gone big. What did they do, I don't know(laughs) right now, even I wasn't supposed to have given birth [ ] what I did in the past, I have already forgotten.

I: had you gone for antenatal check-up?

M: yes about going, I had gone.

I: when you had gone for antenatal check-up, at that time, had you received any advice on first milk?

M: they said to throw the first milk, and then wash the breast and then only feed.

I: oh. And at the time when you gave birth, was there anyone with you?

M: my husband and I were there. And after the baby had come out we called didi(the midwife).

I: oh, your husband was there and later didi came?

M: yes. We called didi after the baby had come out.

I: oh. And that time after the baby was born, did you get any advice from anyone about what should be done with the first milk?

M: here, in the beginning, the nurse lady had already said, when I had gone to put injections, that not to feed the first milk, to milk it first and then to wash and throw it. I did that only.

I: talking about the first milk, which practice do you think is the best for feeding the first milk?

M: which one is to be the best?(questioning herself), that before one, the milking of the breastmilk and then throwing it is also good(she likes this practice), and I feel to feed along with the bigouti milk, no it doesn't do good(she feels feeding bigouti milk is not good).

I: oh. And didi, what do you feel bigouti milk is for you?

M: even while feeding the animals' babies milk, people used to milk and then throw it before feeding their babies.

I: no, about human's bigouti milk.

M: about human's bigouti milk, I don't know.

I: oh. You don't know how is human's bigouti milk?

M: yes

I: I'm sure you have seen your own.

M: my own it used to come yellowish yellowish.

I: for you, what do you feel is bigouti milk?

M: khai, I don't know that, I don't even feel anything.

I: and have you heard of the word, khil? The word khil.

M: on breast?

I: people say khil.

M: khil on breast itself?

I: yes human's khil.

M: yes yes on breast, in a person's early pregnancy, small small khil stays.

I: and what is khil?

M: khai that also I don't know. (Laughs)

I: oh ok. After you gave birth, before breastfeeding your baby, you took out the milk from your breast on the cloth, right? And then you threw, and after that only you washed it?

M: yes

I: or otherwise was it before that.

M: no, I washed it, and then I milked the bigouti milk and threw it and after that I fed the baby.

I: [and after that you fed the baby? that, you did on the first day, right?

M: yes, first day.

I: the days following that, before breastfeeding your baby, each time, how were you breastfeeding?

M: I wasn't milking.

I: oh and you used to wash?

M: no, I didn't wash.

I: oh straight away you used to feed?

M: yes, it was only on the first day, which I washed and threw.

I: oh… and didi, the nurse lady had advised you that you have to wash and throw after milking, right?

M: yes

I: what kind of influence did it make in your decision?

M: khai, till now everything is going fine. I did that only, that way only I fed the milk. Till now, its fine only.

I: ok didi, thank you very very much, and now may be you want to say something?

M: what to say? I answer what you ask me.

I: I only asked you, may be you would also like to ask something?

M: about asking, what to ask? The baby has grown up and become this much (her children have grown up now). Till now everything is fine also.

I: and is there anything you want to say?

M: no, there isn't anything.

H-3: Example of Focus Group Discussion – Chhatiwon Ward 1 (all births attended by family members)

Date of FGD: May 4, 2009

Total time in recording: 50 minutes

Place of FGD: VDC (Chhatiwon) ward no.1 (Jaljale)

The interview took place in one of the classrooms of Shri Gyan Jyoti Prathamik Bidhyalaya, Jaljale. It is 15- 20 minutes walk from the town of Hattisunde, Chhatiwon. There were three early participating mothers for the FGD and since they had walked for one hour to be there and they looked tired, it was decided that biscuits and juice be offered prior to the FGD. Almost one hour of interaction took place before everyone finally arrived. The participating mothers were between the ages of 15-35 years. Out of all the mothers, two participating mothers were extremely shy. They were late arrivals, and since the other mothers had been waiting for a long time and had to go back home early, interviewer was unable to interact, prior to the FGD. Although the two VDCIs were there before and after the FGD, they didn't sit for the FGD, and neither did Pascal Odent, in order to make the mothers feel comfortable. Six females and eleven children were the onlookers. The HSSA was doing the recording and the transcription.

Glossary

Didi: an elder sister in nepali language

Didi haru : plural for didi.

Dai: an elder brother in nepali language

Dai haru: plural form of dai.

Bahini: younger sister in nepali language.

Sasu aama: mother-in-law in nepali language

Sasura: father-in-law in nepali language

Jethaju: husband's brother.

Maiti: home, where women was born and brought up, before marriage (home of her biological parents).

Khil: nepali word for pus or pimple, or like cork in a bottle, also used for the first stale milk or pus like milk that may come from engorged breasts.

Bigouti: nepali word for "colostrums".

Khai : common expression to "I don't know"

Khoi: another way of saying khai.

KEY

...	Short pause
.....	Long pause
[laughter]	Laughter
____	Short silence
_____	Long silence
[ ]	Words undeciphered
-[	interrupted speech
[[	Simultaneous speech
I	Interviewer
M	Unidentified Mothers
H	Health Service Strengthening Assistant
O	Onlooker

ACRONYMS

FGD Focused Group Discussion

MIRA Mother and Infant Research Activities

VDC I Village Development Committee interviewer

HSSA Health Service Strengthening Assistant

I: didi haru, can you tell me something about your children?

Mother: how to say and what kind of things to say about the children? How the children were fed with the milk-

I: like how many children do you all have?

Mother: oh.

I: can you tell?

Mother4: mine is 4.

Mother3: mine is 2.

Mother: mine is 2.

I: one son, one daughter?

H: how many had you said? 1or 2?

Mother: mine is two. Both of them son.

Mother5: six of them

I: you have six?

Mother6: one

Mother: mine is one.

I: one

Mother7: I have five. (Smiles) (Laughs)

I: and yours?

Mother: mine is three.

I: right now, how are your children? Are they healthy?

(Baby crying)

Mother9: till now they are doing well.

I: how are your children? How is their health?

Mother: they are fine (smiles)

I: and when you all had filled the questionnaires the one dai had brought, there was this question, “did you squeeze and throw away the bigouti milk?” There was this question, remember?

Mother: it was there.

I: yes, so from that question, what did you understand?

Mother3: khai, what to understand now. (Laughs)

I: I’ll tell you all one thing now itself, no answer can be right or wrong. Whatever you say, whatever you think you say that because that’s the thing we are searching for. Whatever are your practices, behaviour, belief, whatever you understand is what we are searching for.

Mother4: [ ] I wonder how we are supposed to say?

[Laughter]

I: according to you, how did you understand?

Mother4: some understood, some didn't understand, what do we know?

[Laughter]

{Conversation in Tamang language}

I: how did you understand this question as?

Mother9: why to throw the first milk? It must be fed at first.

I: yes?

Mother9: the first milk must be fed. Why to throw the first milk?

I: you think the question was trying to ask that?

Mother9: yes

I: what do you think the question was trying to say?

Mother4: [ ] what kind of? What kind of? Looks like we won't be able to understand.

I: what do you think the question was trying to tell you?

Mother1: if we throw the first milk that comes, the baby will [ ], the first milk that comes must be fed [ ] the first milk that comes, must be fed, it will be good for the baby. It means to say that.

I: and for you?

Mother: I'll also feel the same.

I: what do you think the question was-?

Mother1: [people from earlier time used to say that that the first milk must not be fed, we have to throw the khil. and the ones from now say that the first milk must be fed, it is good for the baby.

I: and for you, what do you think the question is trying to ask? Our thinking differs, right? Like one may be thinking one thing and the other person may be thinking something else, right?

Mother4: people from earlier times, used to say that it should be thrown, khai, right now, that same first bigouti milk must be fed, they say. We feel like that. We are feeding the babies, we are not throwing.

I: what do you think the question is trying to say? Do you remember this question? You had been asked, right? “Before breastfeeding your baby for the first time, did you squeeze and throw the bigouti milk?” , this question was there. And so what do you think the question was trying to say?

Mother6: the first bigouti must be fed to the baby. It is good for the baby.

I: ok, and what about you?

Mother7: for me also, it’s the same. [Laughs]

Mother: [ ]

I: yes? Yes? Please do tell, I didn’t hear you. can you tell again?

Mother10: whatever we say, may not be the one …. I wonder what we are supposed to say?

H: whatever you all think, however you all have understood, you can say that, right? You all don’t have to make it up and say.

_____

I: didi, what do you think the question is trying to ask?

(Baby crying)

H: Namaskar didi

(Baby crying)

I: yes?

Mother: I don't know [ ]. khai, what to say?

I: it's your thinking; you must be thinking something, right?

Mother: [ ]

(Lots of noise can be heard)

(Conversation in Tamang language among the mothers)

Mother: [ ]

I: oh. And didi, can you tell what is it trying to say?

{Lots of onlookers talking at the back}

I: what do you think? What do you think the question is trying to say?

Mother: (laughs)

I: didi, what do you think the question is trying to say?

{Someone is encouraging her to say}

I: “before breastfeeding your baby for the first time, did you squeeze and throw the bigouti milk?”-

Mother: [ ]

I: no no. I’m not asking that. Dai had already asked you all this question. Yes, now what do you think, this question was trying to say?

(Baby crying)

{Babies playing among themselves}

I: did you all understand what I said?

(Babies crying)

I: did you all understand the question I was talking about?

Mother: [ ]

I: yes?

Mother: [ ]

I: did you understand?

Mother: yes I understand didi.

I: did you understand?

Mother: khai.

{Shifting of the recorder}

I: did you understand the question I was saying, didi?

H: its ok, its being recorded.

I: yes?

H: you may sit didi

Mother3: [ ] for what. The first milk must be thrown. People from earlier times used to say. Some people say we have to feed the bigouti milk, and some say we don't have to feed. We have fed it. And dai and all have written the names and taken it. For what is it, for what they have taken the names, we couldn't understand that. [ ] we didn't know for what they had taken down our names.

I: can you say again?

Mother3: people from the earlier times, old mothers used to say that the first milk must be fed to the baby and some say, we must not feed, that bigouti milk. We must not feed they say. Whereas we have been feeding. We have two children. We have been feeding both the kids. And dai and all have come to take our names. And we sent dai and all with our names. And for what they are taking the names, we won't know that.

I: oh. If dai and all ask you all mothers in the local community about health and other information, then only they come to know that, oh! These numbers of mothers are doing this, and these numbers of mothers are not doing this, right? But now, but I'm not telling you all whether the bigouti milk if fed is good or not good. I'm just asking you all. Let's say I'm going to because to understand only about what you all are doing, ok? And just that time, I wasn't asking you all, that was what dai and all had asked you all, right?

Mother3: yes.

I: and it was to know, how did you understand the question as? For that I was asking.

Mother3: for disease [ ]

I: ok, now can you all tell me what did you all do with the first milk before breastfeeding your baby for the first time?

Mother: [ ]

I: yes? What did you do with the first milk that comes_____?

(Baby crying)

[Laughter]

H: in the beginning did your milk come? What did you do at that time?

Mother2: gave the baby.

I: yes?

Mother2: gave the baby milk.

H: no, she has already said-

Mother2: [I fed the baby with milk.

(Baby crying)

H: did you do anything before feeding the milk?

Mother2: no

(Baby crying)

H: that's the thing.

I: and do you remember what you did with the first milk?

Mother1: at first, the baby was fed with ghee, honey [ ]

(Baby crying)

I: oh, and did you feed the first milk right after then?

Mother4: yes, right away.

I: oh. And what about you?

Mother: even the same

I: can you tell?

Mother: we have to feed otherwise; if we don't feed the baby will forget to suck the milk.

I: did you feed the first milk that comes?

Mother11: I fed

I: yes?

Mother11: I fed.

I: oh ok you fed. Yes, didi, what about you?

H: what did you do?

I: the first milk that comes, what did you do with it before breastfeeding your baby for the first time?

(Lots of noise at the back, children at the back are talking)

O: did you feed the milk or did something else, that you have to say, at the time when the baby was born.

I: listen, look here, your first milk did come, right? Yes, what did you do with that milk after the baby was born? Before the baby had anything, what did you do with your first milk?

Mother10: fed the baby.

I: you fed? Oh. And what about you?

Mother5: even I.

I: oh even you fed. And you?

Mother6: mine too (smiles)

[Laughter]

Mother7: I also fed.

Mother8: I also fed.

I: and you?

Mother9: I also fed.

I: and you?

Mother10: I did feed too.

(Baby crying)

I: yes? Yes?

Mother11: it’s the same with everyone. After giving birth, we have to feed.

I: and you?

(Baby crying)

And you?

[Lots of noise at the back]

Mother: I also did the same.

I: and, now can you tell me. You fed the baby with the first milk?-

H: why is she crying?

I: And now can you tell me why did you do this?

{Conversation between mothers in Tamang language}

I: can you tell me why did you feed?

H: why did you feed the first milk that comes?

Mother: may be because the baby will be saved from the diseases.

I: oh. Yes everyone has their own way of thinking.

Mother: the baby will die, if the milk is not fed. We’ll have to feed.

I: and why did you feed?

Mother: the first bigouti milk?

I: yes

Mother: that bigouti milk –

I: yes, yes

M: because the baby will be healthy, that's why. [ ] we must feed that I believe. Otherwise, the people in the past [ ]

Mother3: the baby will die, if they won't have.[Speaking in half nepali, half Tamang] [ ] we keep the baby for a while , [ ] (Laughter) The mothers who have just given births say, oh! I feel shy, I feel shy, I won't feed, they say. [ ]

[Laughter]

I: and didi, why did you feed your baby with your first milk?

Mother: _____

H: why did you feed that time? What had you felt and you fed?

Mother8: because the baby will die-

Mother1: the first milk is nutritious, it must not be thrown [ ]

Mother3: [ ] why to feel shy, right?

H: yes! That's why we sent them (referring to VDCIs and Pascal) outside. We are all more or less same same.

Mother3: when we take baby to [ ], we'll have to take it out like this. Before they used to cover the breast. Now, why to cover it? Wherever we go. Whether it's male or a stranger. We'll have to take it out like this way and feed the baby, while walking in the streets. (She is saying that whether it's a male or a stranger, they'll have to take out their breast from their clothing to breast feed the babies even if they are walking in the streets.)

Mother: because the baby's mouth will be dry.

I: and why did you feed, didi?

{Baby crying} {Lots of noise}

I: why did you feed?

H: [ ] leave it (addressing mothers, referring to the baby}

{Everyone's attention is on the baby}

I: why did you feed the baby?

Mother: sick [ ]

[Laughter]

{Mothers making a conversation in Tamang language}

Mother: what do I have to say?

I: that time you told me, what you did with the first milk, right? Now, why don't you tell me the reason for doing it?

Mother: [ ]

I: what did you say? I couldn't hear it properly. Can you tell me again?

Mother14: after the baby is born, one thing that we assume is that the baby is hungry, and moreover the baby also cries. So we'll have to feed, also.

I: and about you?

Mother9: people say that if the baby is not fed for a while the baby's throat becomes dry, so obviously we will have to feed.

I: and what about you?

Mother: some of them cannot say.

{Mothers talking among themselves}

I: you all told me what you did with your first milk on the first day. And now, the days following the first day, what were you all doing with the breastmilk before feeding the baby? What were you doing? How were you feeding?

{Baby talking}

H: what did you say? What did you say? Can you tell in an understanding way?

Mother: [ ]

I: yes?

Mother: [ ]

(Baby talking)

I: didi, do tell, nothing will happen.

H: however you have thought, however you have done, you are supposed to tell that. What to tell other new things, right? (I don't think there's anything new to say)

I: why don't you say, you fed the baby with the first milk when the baby was born, and now the days after that, what were you doing with the milk? How were you feeding?

Mother1: how to feed? Was feeding from time to time. (Smiling)

I: and you?

Mother3: [ ] the baby will be sucking only one, and [ ] (sucking only one breast)

[Laughter]

I: what were you doing with?

Mother4: before feeding?

I: yes

Mother4: before feeding the milk or after feeding the milk? [Laughter]

[Laughter]

I: (smiling) before feeding the milk … were you doing anything with the milk?

Mother4: I haven't done anything.

[Laughter]

I: and you? … How were you breastfeeding?

Mother6: to feed after cleaning.

I: oh ok. How do you used to clean?

Mother6: washed with water.

I: oh. Your breast?

Mother6: yes

I: and you?

Mother5: same

[Laughter]

I: how? How? Like how same?

Mother5: washed with hot water.

I: oh. Before feeding the baby were you washing with hot water?

Mother5: yes

I: the days following the first day, after the baby was born, were you continuously washing with hot water before each feed? After the first day, the days following that were you doing that?

Mother: _____

I: yes, were you?

Mother: [nodding of head]

I: and what about you?

H: looks like didi doesn't want to see our faces (smiling). You are like just turning towards that that side. (Laughing) Even if it's not nice, why don't you look at our faces?

Mother: everyone's the same (faces)

H: I think it's too bad.

I: didi, listen-

H: we really want to look at you. … Why to feel shy? We are girls girls. Moreover, you all have become mother, while we two are still left to be mothers. Lets listen to your experiences, later lets we also do those things when we become mothers, right?

I: like we will get to learn new new practices. She told her practice, she also told us her practices. Like what did she do? Yes, you all will be helping in searching new new practices-

H: [[ ] practice that you have been doing?

I: didi, can you tell what were you doing the following day or the following days with your milk after you first breastfed the baby? What were you doing? What were you doing with the milk before feeding?

Mother: ____

H: didi, what were you doing before feeding?

Mother11:[ ]

H: you fed after washing? Oh

I: and you?

Mother7: me, I feed without washing.

I: and you?

Mother: [ ]

I: what were you saying?

Mother3: I wash it while taking bath (laughs)

I: yes. And you?

Mother: ____

I: and you?

(Talking among themselves)

Mother3: [I wash nicely while taking bath]

I: ok now, can you tell me what advice have you received on first milk, like what you should do with it?

Mother: yes?

I: had you received any advice like you should do this or this?

H: had you received any advice from anywhere before?

Mother7: I haven't

Mother5: I haven't

I: you haven't?

Mother6: no I haven't.

I: have you received it?

Mother3: no, I haven't

I: and you? Have you received?

Mother: __

I: and you?

I: and when you gave birth was there anyone with you at that time?

H: when you were delivering the baby?

Mother12: [ ] at the time of delivery?

I: yes

Mother12: people from homes and villages.

I: oh

Mother3: [ ] no but still, even our sasu can help us. But still I'll have to count people from home, and I'll have to tell. (she means to say that her sasu was there and that she has to count her family members as well)

I: and didi yours?

Mother2: mine sasu

Mother: [talking to some

I: and yours?

Mother1: sasu

Mother: [ ]

I: what are you saying? You were alone?

Mother:____

I: what are you saying? You yourself? Were you alone?

[Laughter]

H: yes, she was there alone.

I: you said, you yourself were there. You your self means you were there alone?

[Laughter]

H: she was there alone.

I: and who was there with you when you gave birth?

Mother6: father-in-law

I: father-in-law? Oh.

Mother6: mother-in-law, father-in-law,

I: sasu, sasura? And?

Mother6: husband

I: husband and?

Mother6: that many.

I: oh and yours?

Mother7: mine, sasu and my own aama, the mother who gave birth to me.

I: oh and didi yours?

Mother8: [ ]

I: and didi yours?

Mother9: mine, jethaju didi haru were there.

I: oh and didi, yours?

{Mothers talking among themselves}

I: and yours yours?

Mother: my neighbours were there.

I: oh your neighbours were there? Now, who all were there with you all during the delivery, you had said that, right? Had they given you any advice? … On first milk?

{Mothers talking among themselves}

I: do you remember?

Mother3: [ ] if we don't feed them for a while the baby will look for milk. The mouth will be dry, they say. They say that.

I: and had you all received any advice on first milk? From them?

Mother7: no, I hadn't

I: you hadn't? ... At the time of delivery your neighbours were there with you, so had you received any advice?

Mother12: I didn't get anything. They even didn't say anything. What advice to get?

I: oh ok. That's fine. Ok now, had you all gone for antenatal check-up?

Mother12: yes, had gone.

I: out there, had you received any advice on first milk?

Mother12: khai, I didn't get anything.

I: oh. And had you all gone for antenatal check-up?

Mother: [ ]

I: and had you received any advice on first milk?

Mother3: nothing.

I: and you? And you all? … Looks like all of you friends who feel shy planned and sat together.

{Mother 4, 5, 6, 9, 12 had not received}

[Laughter]

I: and had you all received any advice when you all had gone for antenatal check-up?

Mother: -inaudible-

I: oh you haven't got. That's ok. And do you all have sisters? Mine, like I have two sisters who are elder to me, and I have one younger sister. We are like four sisters.

Mother3: two sisters and I am the eldest.

I: two sisters and yours?

Mother6: mine three.

I: oh three? And yours?

Mother: I have …

[Laughter]

I: did you forget how many you had or what?

Mother1: if I say also what to say. We have eight brothers and sisters. (because she has many siblings)

I: oh ok. And yours?

Mother11: [ ]

I: oh three? And yours?

Mother5: four

I: yes? Four? Oh you two have the same number, same right?

Mother7: three

I: oh three and yours?

Mother8: mine is also three.

Mother9: mine is also 3

Mother12: mine is also 3

I: yes?

Mother: mine is also 3

I: oh my god! And yours?

Mother: mine is also 3

[Laughter]

Mother: all 3 3 (she means to say most of the mothers have three siblings)

I: yes

[Laughter]

Mother: mine is 2

I: do you all know what your sisters are doing with the first milk?

Mother: the first milk that comes.

H: what had your sisters done? Does anyone of you all know what your sisters had done?

I: after giving birth to the baby-

H: the milk that comes after birth what did they do with it, do you all know?-

I: [yes?

Mother: oh our mother?

I: no, no your sisters.

[Laughter]

H: later [ ]

Mother7: [oh our younger sisters haven't even married.

[Laughter]

Mother: she herself must be the eldest, so what she'll know.

Mother: the eldest

I: your sisters, who have already given birth, what are they doing with their first milk, do you all know? What do they do?

Mother: [ ] [laughter]

Mother1: sister hasn't married.

Mother: [ ]

H: why are you laughing? (smiling)

Mother: my sisters haven't even married.

I: and yours?

Mother: mine also haven't, one sister is married, she has not got baby yet.

I: can you explain it to me again, properly?

(Baby crying)

Mother: [ ] I'm sure she [ ] and gave. I gave like that.

I: and what are your sisters doing?

(Baby crying)

Mother: -inaudible-

I: that what? Do you know what they are doing?

Mother: I don't know

I: oh you don't know? And yours?

Mother6:I don't know, sister is far.

I: oh. And yours?

Mother: I'm only the eldest

Mother7: they are far.[ ]

Mother8: they live far.

Mother12: mine is in kathmandu, I don't know.

I: oh that's fine. I'm sure it's been so long you have been staying here, do you know what the mothers in your local community are doing with their first milk, before breastfeeding the baby?

Mother: no, no there isn't.

Mother: the milk must be fed. That only.

I: oh

Mother: [ ]

I: yes, what did you say didi?

Mother4: after the baby is born, people don't come to village to teach us.

I: oh. And yours?

Mother1: first they wash with hot water and then they feed.

I: oh and do you know?

{Mother 4, 3, 5, 11 doesn't know}

I: and didi, do you know?

Mother7: who me?

I: yes

Mother7: khai, I don't know.

{Mother 9, 8, 12 doesn't know}

I: its ok, we may not what happening in other's home. For baby' health…. –

I: its ok, we may not know what is happening in other's home. For baby's health …-

Mother12: khai, which one to say?

I: do you know what the mothers in your local community are doing with their first milk, before breastfeeding the baby?

Mother1: to wash with hot water before washing. And to feed the first milk.

I: oh and you?

Mother2: I don't know

[Laughter]

Mother3: where to get hot water [ ]

I: do you know what the mothers in your local community are doing with their first milk, before breastfeeding the baby?

Mother: the first milk must be fed. It has been said from the beginning.

I: oh. And you feel feeding is the best.

Mother: [ ]

I: oh. And you? Do you know what the mothers in your local community are doing with their first milk, before breastfeeding the baby?

Mother6: We must feed.

I: oh ya?

Mother12: they say we have to feed the first milk, I fed that milk.

I: and you? Your thoughts may differ. Do you know what the mothers are doing with their first milk, before breastfeeding the baby?

Mother7: the first milk must be fed. It will be nutritious for the baby.

I: oh. And for you?

Mother8: the first milk

I: yes, what first milk

Mother8: to feed

I: and for you?

Mother9: the same for you

I: and for you?

Mother: [ ]

I: which practice you find best?

Mother: I feed (fed the bigouti milk)

I: and you?

Mother: what do I know?

I: it's your thought. Its not that you have to know or you must not know. What you are thinking that you have to say. One's thought, one knows the best. What do you think should be done with the first milk for a baby's health? There no right or wrong answer.

Mother: [ ]

Mother: I have been feeding.

I: oh you feel to feed the first milk is the best?

Mother: yes

I: oh. And what do you think is bigouti milk?

Mother12: isn't it the thick milk?

I: yes, you feel like that? And you?

Mother: the same thing.

I: and you?

Mother6: the first milk is the thick milk.

I: what do you think is bigouti milk? She has said and now why don't you say?

H: what is bigouti milk? How is it like?

Mother8: bigouti

I: yes.

Mother8: bigouti milk is thick

I: and for you?

Mother: even for me

[Laughter]

I: what do you think is bigouti milk?

Mother: that same thing

I: same thing meaning?

Mother: [ ]

I: what did you say, I didn't' hear. What did you say?

Mother: I'm sure she is feeling shy.

I: what do you think is bigouti milk?

Mother11: bigouti milk is thick

I: and you?

Mother: the thick milk

I: what do you think is the difference between khil and bigouti?

Mother4: the one that is in the breast, we call it khil.

I: oh

Mother4: that is also milk.

I: what do you think is the difference between khil and bigouti?

Mother: khai.

I: didi, what do you think is the difference between khil and bigouti?

Mother6: after the khil comes out, the milk will come. The bigouti milk.(after the khil comes out , bigouti milk comes out)

I: khil means?

Mother6: when the baby is in the stomach the khil comes in the breast.

I: what do you think is the difference between khil and bigouti?

Mother8: milk

I: you mean to say khil is milk

Mother8: yes

I: than what is the difference between bigouti and khil?

Mother: _____

I: what do you think is the difference between khil and bigouti?

That time you said bigouti is thick, and khil is milk, right? And for you what is khil?

Mother9: khil is black, and bigouti is yellow.(laughs)

I: and you?

Mother: who?

I: you

[Laughter]

Mother7: khai, what to say? Everything is same.

I: no no, everyone has their own thought. What do you think is khil for you?

Mother7:____

Mother: do say

[Laughter]

I: have you heard of khil before?

Mother7: no. I just heard right now for the first time.

I: ok it's alright its alright and for you what is khil?

[Laughter]

Mother: breast's khil.

I: breast's khil, meaning? Whats khil?

Mother: _____

I: what is khil?

Mother11: I don't know.

I: oh you don't know its ok…… Did, thank you so much

H-4: Example VDCI Interview

Date of the VDC I interview: April 26, 2009

Total time in recording: 13 minutes 58 seconds

Place of interview: (VDCI contributions kept anonymous in thesis)

Glossary

Sasu aama: mother- in – law in nepali language

Dai: an elder brother in nepali language

thede: tamang word for pus or pimple, or like cork in a bottle, also used for the first stale milk or pus like milk that may come from engorged breasts.

Bigouti: nepali word for "colostrums".

Khai : common expression to "I don't know"

Khoi: another way of saying khai.

dewar: husband's younger brother in nepali language

jethaju: husband's elder brother in nepali language.

maiti haru: people/folks from the mother' parental home.

Phancha: throwing of the milk in order to prevent evil spirits (maybe Chepang word)

KEY

...	Short pause
.....	Long pause
[laughter]	Laughter
(_____)	Long silence
[ ]	Words undeciphered
I	Interviewer
V	VDC I

ACRONYMS

MIRA Mother and Infant Research Activities

I: dai, do tell me something about yourself.

V: About me? Or about the VDC?

I: No, about you.

V: about me? How should I go? Can I start from the introduction?

I: yes, ok

V: Ok, my name is Binod Chepang, Bharta VDC, ward number8 .five months earlier, I worked in MIRA as a VDC I in Bharta.

I: that means its five months since you have been working in MIRA?

V: for the past 4-5 months, I used to… 30months. More or less I did for 30 months in MIRA.

I: so, it's been 30 months that you have been in MIRA? And it's been 4-5 months that you have been in this VDC?

V: no, 30 months. Yours this, our VDC I programme which got faced out, second phase's. It's been 4-5 months after the phase out.

I: Ok, so now let's say that you have worked in MIRA for?

V: 30months

I: 30months

V: Yes

I: So, you have worked in this VDC for? In this VDC.

V: Yes, 30months

I: so from the time you have started working for MIRA, you have been working in this VDC. This bharat VDC?

V: not from the beginning . from 2063, sharwan 17 th.

I: oh ok. No, in MIRA'S questionnaire, the one you conducted there was this question "did you squeeze and throw the bigouti milk before the breastfeeding of your baby?" How did you understand this question as?

V: at first, this VDC's mothers on breastfeeding, later they got some information from the mothers (at first the mothers from the VDC did one type of practice, but then got some other information). How it was before this was, still this practice is the same; a lot of mothers are not being able to stop (whatever the practices were before, it's still carrying on the same). They have the practice of squeezing the first milk and throwing it away. They won't know about bigouti milk. What kind of practice is there mostly in our community is a mother the first has some effects on babies. The mothers are seen squeezing and throwing away the milk, even when filling the SERMI questionnaire and some mothers they don't throw bigouti milk. Even though they don't know it's important but the practice of cleaning and giving is there.

I: oh ok. But what did you understand this question as?

V: Me? How I understood is, according what the females have done was, the females they … what do you say in nepali? ...what's the word we use in nepali? ya so that the evil spirits won't enter the baby, they offer the first milk. So, that the evil spirits don't enter the baby, I have seen the mothers squeeze and throw away the milk before feeding the baby. Like that way they feed the baby.

I: do keep this in mind; there is nothing as right and wrong answer. Whatever you are thinking, you can say that.

V: oh ok.

I: How easy was it for you to ask this question?

V: While asking this question, mostly I didn't have much difficulty. All of them, while asking mothers you all why do you squeeze and throw? I didn't have any particular difficulty.

I: Can you tell me how you were asking this question?

V: How I used to ask this question was first you gave birth to the baby? While first breastfeeding the baby, what do you used to do? When asked did you used to clean and give or do anything else. The first bigouti milk they used to give after phancha. After pancha they used to throw and give, they used to say that.

I: the answer to that question had just two options, "threw" and "I didn't throw."

V: yes threw and didn't throw

I: yes, now ignoring that that categories, what kind of answers did the mothers give to this question?

V: mothers, at that time in that questionnaire, some number of mothers clean and throw, they throw only little and not in big amount. There were mothers who used to squeeze and throw. Yours this, in Bharta VDC mostly it is seen that in Chepang community mothers are throwing. According to me, Chepang community they throw and give practice practice (he thinks Chepang community have the practice of throwing and then giving). For example, not just the first milk, after working in the field, on the breastfeeding matter, they squeeze and throw the first milk and give the baby….that is why, in the matter related to first breastfeeding , mothers have the practice of squeezing and throwing. So, this is like something that has been from the early times, like what to say? ...

I: Practice

V: yes, Practice. It's like that. i understood like that. Mothers who have understood the importance of first bigouti milk, whether it's from our community or from every that that they have understood, lot of mothers don't do that.

I: oh ok.

V: They do that because they don't know the importance of milk.

I: Meaning, what did she give the answer to that question?

V: She, if she has thrown she said she threw and if didn't throw, she said she didn't throw, I just cleaned the breast and than only gave the baby, these things used to come up.

I: oh ok. In that SERMI question, there were just two options for the answer, threw and didn't throw. So, in what kind of situations did you mark as a yes "threw"?

V: in the category of I threw when asked what did you do at the time of first breastfeeding, the answer was I squeezed and threw the first milk. One kind of thede, they threw not just thede, but when the baby used to suck the milk, and the milk wouldn't come out, they throw the milk at the time of throwing the thede as well.

I: What do you mean by thede?

V: In the beginning, at the time of giving birth, right in our nipple thede is supposed to be thede, according to what the mother have said. And because of that, if it's not squeezed and thrown like that the milk won't come for the baby. When the baby sucks, if the milk doesn't come, they thrown. In cases where they throw, I used to ask how much did you throw? They used to throw 3 or 4 times. And the milk has come or hasn't come for the baby?

I: What is it?

V: Milk. After squeezing it ¾ times, ok now my milk will come, ok after this much of my milk comes the baby can drink milk after saying my milk comes for the baby the milk is given to the baby, that’s the practice.

I: oh ok, so in that situation

V: uh yes, in that situation I marked as thrown

I: in what kind of situation did you mark as not thrown?

V: in the section of "didn't throw', I used to ask them, did you squeeze and throw the milk. They used to say yes I threw. But at the time when I used to ask, how much you threw, what the mothers used to say was that they cleaned and about the thing called thede, a little bit of it was squeezed. And not much of the milk was wasted. They used to say that. That during cleaning they didn't throw. And so, they wouldn't throw milk at that time. They used to clean and than only squeeze the thede little bit, but with the milk, they wouldn't big amount of the milk. And like that way, they used to say they didn't throw. They used to only clean.

I: Only clean. And thede?

V: That thede they used to squeeze it. They squeeze it only and only milk would come. They squeeze it and only a little bit of thede comes, what they used to say was when asked how is thede like? They said it's like small small pimples. Yes, they used to squeeze only that and clean it. In like this time when the throw only this, I marked it as ' didn't throw'

I: After squeezing little bit what did she say?

V: It's like pimples, I believe. After squeezing a little bit, the pimple used to come out a little bit and that time, they used to clean it and they don't feed that.

I: And after squeezing is that fed to the baby or not?

V: They don't throw, they clean it. It doesn't come in big amount, it comes only little bit. That too its not even milk, it's only thede. And in most of the time they only cleaned it. So those times, I marked it as "didn't throw".

I: I'll ask again, ok?

V: Ok

I: after the thede comes, is it fed to the baby?

V: It's fed to the baby

I: oh ok

V: thede has come, after thede comes they are like now my milk will come and they feed the baby.

I: oh ok. And now was it easy for you to classify threw and didn't throw?

V: it wasn't that difficult for me to classify. Mothers used to say that they threw even if they threw or didn't throw them used to say that they threw. And after I started explaining, it wasn't actually that difficult. I found it easy.

I: oh ok. Now, was there any point where you had difficulty?

V: About that question?

I: yes.

V: what difficulty I used to have was that it mostly used to be daughter-in-law, if dewars were there its not that much difficult but if its their jethaju, maiti haru in their presence I used to feel awkward. When their jethaju used to be nearby, I wouldn't question like this way in loud voice. If there is anyone or their jethaju and they are busy in their own talk than only I used to ask them, if they used to squeeze and throw the milk at the time of giving birth. I used to ask like that way only in soft voice and than only I used to ask questions only to MW's group.

I: MW?

V: Mothers.

I: ok now, do you want to say anything?

V: mine that?

I: yes

V: what I want to say is that in our Chepang community mostly. Not only Chepang community but in our Bharta VDC according to my experience, the breastfeeding is that milk has the power to resist, fight the illness. It is like a holy water like that kind of importance, they have not understood. Especially if that importance is explained to mothers' group, I feel that the number of mothers throwing would reduce. I have this hope.

I: do you have any questions?

V: my questions, I don't have.

I: Dai, thank you for giving us your precious time.

V: ok thank you.

I: as far as I have understood that thede, if it's thrown 2/3 times you said its thrown. And in situation when a little bit of thede came and they fed the baby you marked as didn't throw, right?

V: yes

I: Dai, thank you.